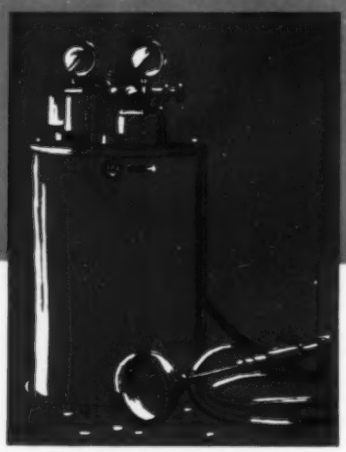
MARCH
1959

FOUNDRY

A PENTON PUBLICATION



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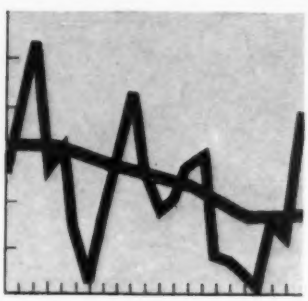

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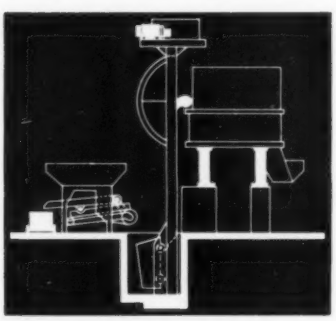

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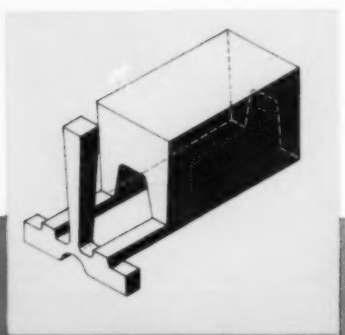

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STRONGER CASTINGS FOR 300,000 TRACTORS

Farm equipment manufacturing, giant consumer of gray iron and malleable iron castings, is one of the important markets to most foundrymen. Production of farm tractors has doubled since 1945—and continues upward in excess of 20,000 units monthly.

FERROCARBO Briquettes, a patented product by Carborundum, are assisting the foundrymen in meeting these increasing production demands. They enable them consistently to make stronger, finer-grained, denser *yet more machinable castings.* Keep pace with this growing industry by making sure FERROCARBO is in your production picture.

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FOR MORE INFORMATION on how you can obtain top quality in the castings that you produce, write for Form A-1497, Dept. F91, The Carborundum Company, Niagara Falls, N. Y.

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How to control casting quality:

use quality-controlled alloys from Reynolds Aluminum

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One good way to be sure of uniformity and high quality in your aluminum castings is to be sure of the quality of the pig or ingot you use. Many foundries have solved their quality-control problems by using Reynolds Aluminum pig and ingot along with Reynolds technical and consulting services. (You get *more* than metal when you buy from Reynolds.) High standards, painstaking production and inspection methods all assure the consistent high quality of Reynolds casting alloys.

In addition to the large stocks of casting alloys maintained at our producing plants—Jones Mill, Arkansas and Troutdale, Oregon—an important part of Reynolds service to the foundry industry is a nation-wide network of ingot distributors whose extensive stocks are even closer to you.

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Company_____

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Watch Reynolds new TV shows—**"WALT DISNEY PRESENTS"** and **"ALL-STAR GOLF"**—every week on **ABC-TV.**

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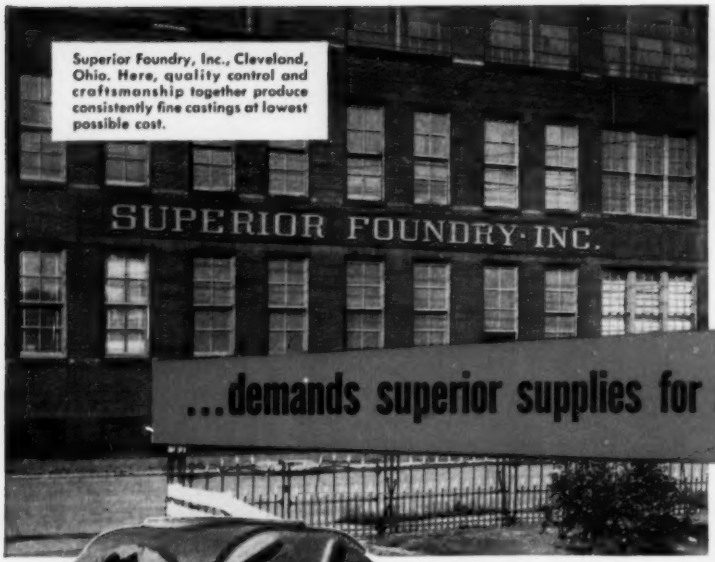


Superior Foundry, Inc., Cleveland, Ohio. Here, quality control and craftsmanship together produce consistently fine castings at lowest possible cost.

Mullers supply molding machines with seven basic facing sand mixes. CROWN HILL SEA COAL and GREEN BOND BENTONITE are introduced in varying amounts to correspond to the specific mold requirements.

...demands superior supplies for accurate control of sands

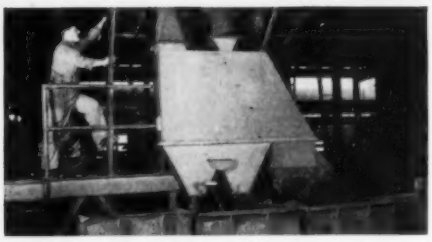
Complex castings ranging from 10 to 2200 lbs. are produced by Superior Foundry for numerous automotive, air-conditioning, and road building equipment manufacturers. Illustrated is an intricate compressor housing with critical internal dimensions and thin wall sections. It is typical of the Tiffany-like work performed by Superior Foundry, and emphasizes the need for uniform sand mixes.

Quality is the watchword up and down the line at Superior Foundry, Inc., Cleveland, Ohio, where a system of statistical quality control supplements individual skill and ingenuity—intercepts errors and puts them in check before they can multiply. Control is centered in three primary areas: (1) Metallurgy (2) Pattern Design (3) Sand Mixture.

Accurate control of the molding sands is maintained through the use of statistics. In other words, Superior Foundry has learned to duplicate successful sand mixes and apply them scientifically on repeat, or similar, orders.

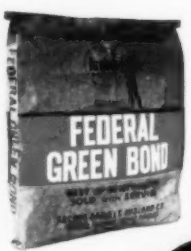
Important to casting quality is the uniformity of the ingredients introduced into the facing and system sands. That is why uniform ADM-FEDERAL CROWN HILL SEA COAL and GREEN BOND BENTONITE have been specified for years by Superior Foundry.

Call your ADM-FEDERAL Representative today; ask for a demonstration of CROWN HILL SEA COAL and GREEN BOND BENTONITE in *your* foundry.



Sands are reconditioned by removing fines in this sand scrubber. Reclaimed sand is reused in the facing sands. This scrubbed sand is also used with perfect results in the core room where LINOIL is employed as a binder and ADM-FEDERAL REFRACTORY CORE WASHES are used.

CROWN HILL SEA COAL is carefully graded into six distinct grinds. It is uniformly high in volatile combustibles and extremely low in sulphur and ash content. Through rigid control of these characteristics CROWN HILL SEA COAL offers the ultimate in dependability, performance, and uniformity.



GREEN BOND BENTONITE, the purest of Western bentonites, provides the high degree of quality and consistency needed in shops like SUPERIOR where statistical quality control is employed. This material is unmatched in its natural bonding power with maximum permeability.

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FOUNDRY
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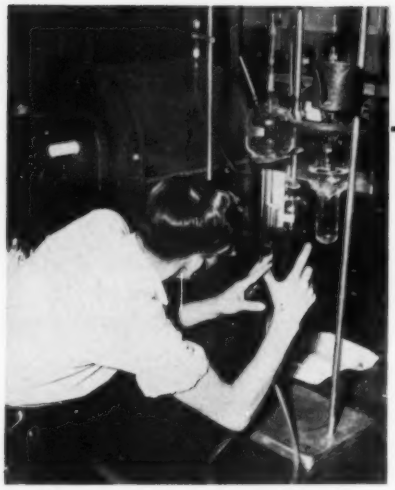

What sort of a job is being done by the young engineers who have entered the foundry industry in recent years? A study by the Foundry Educational Foundation (Page 90) indicates that most of these men have advanced rapidly to responsible positions.

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AFS Congress and Engineered Castings Show . 100
Preparations for the 1959 Congress and Engineered Castings Show of American Foundrymen's Society are entering final stages. The dual meeting will feature more than 100 technical papers and numerous exhibits. Here are details, including a preliminary list of exhibitors

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Art Editor: DON S. CADOT

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New Cars Use 44 Lb of Aluminum Castings . . . 190

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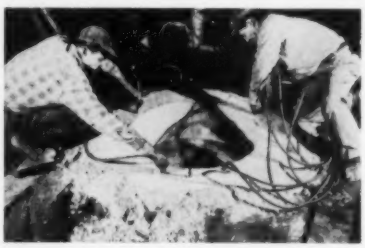
FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions. Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly and copyright 1959 by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

THE EDITORS' WORKSHOP

CO_2 PROCESS: Two articles on recent developments in sodium-silicate bonded sand are being offered FOUNDRY readers. In this issue (Page 69) Waldemar Schumacher

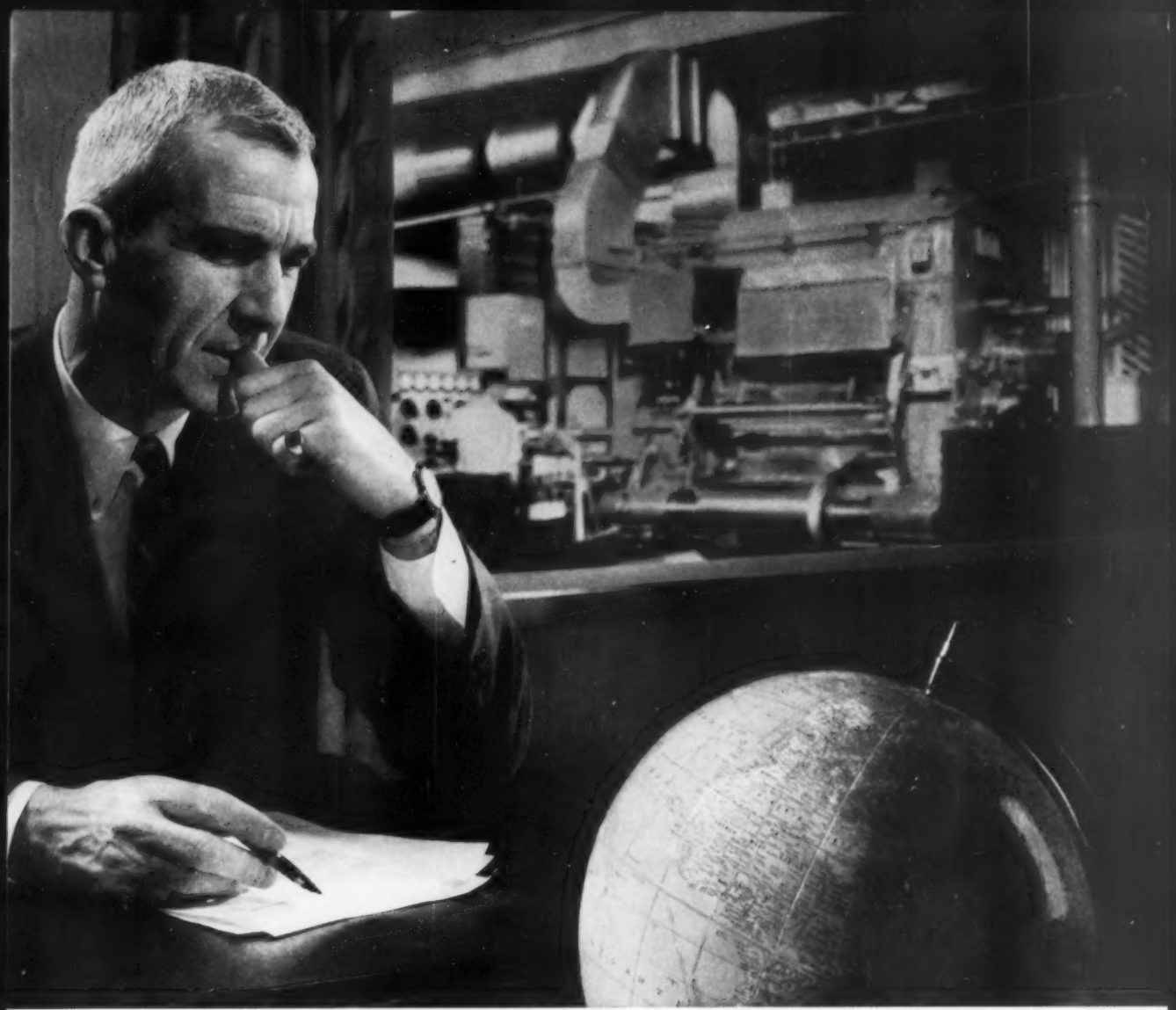


discusses practices affecting casting quality and operating costs. A report from the Naval Research Laboratory, to be presented in a coming issue, offers suggestions for most efficient use of the process.

NEXT MONTH: With the 63rd Castings Congress and second Engineered Castings Show of the American Foundrymen's Society scheduled for April 13-17, in Chicago, April will be our Preconvention Issue. In addition to technical articles and regular features, a special section—"Operation Marketing"—will include five timely articles on how to manage and sell more effectively.

ALUMINUM: Development of new markets has spurred postwar growth in consumption of aluminum castings. Rockwell Mfg. Co. found the number of aluminum

components in its products increasing almost daily and decided to build its own diecasting plant (Page 93). New uses in automobiles have pushed consumption of aluminum castings in 1959 models to 44 pounds per car (Page 190).



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who wonder who's watching the world for profitable new applications and alloys

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But he sometimes wonders about the rest of the world. Is there in England, for example, or Canada, or somewhere in Europe, an alloy unknown to him—but measurably better than the "equivalent" he's now using? Is there some recent fabricating refinement, finishing method, or new end product use he should know about?

Watching for new aluminum opportunities—wherever they may exist—is another way that Aluminium Limited serves its U.S. customers, independent aluminum fabricators. Its representatives and engineers are kept informed by a day-to-day exchange of information among their company's world-wide affiliate organizations and research facilities.

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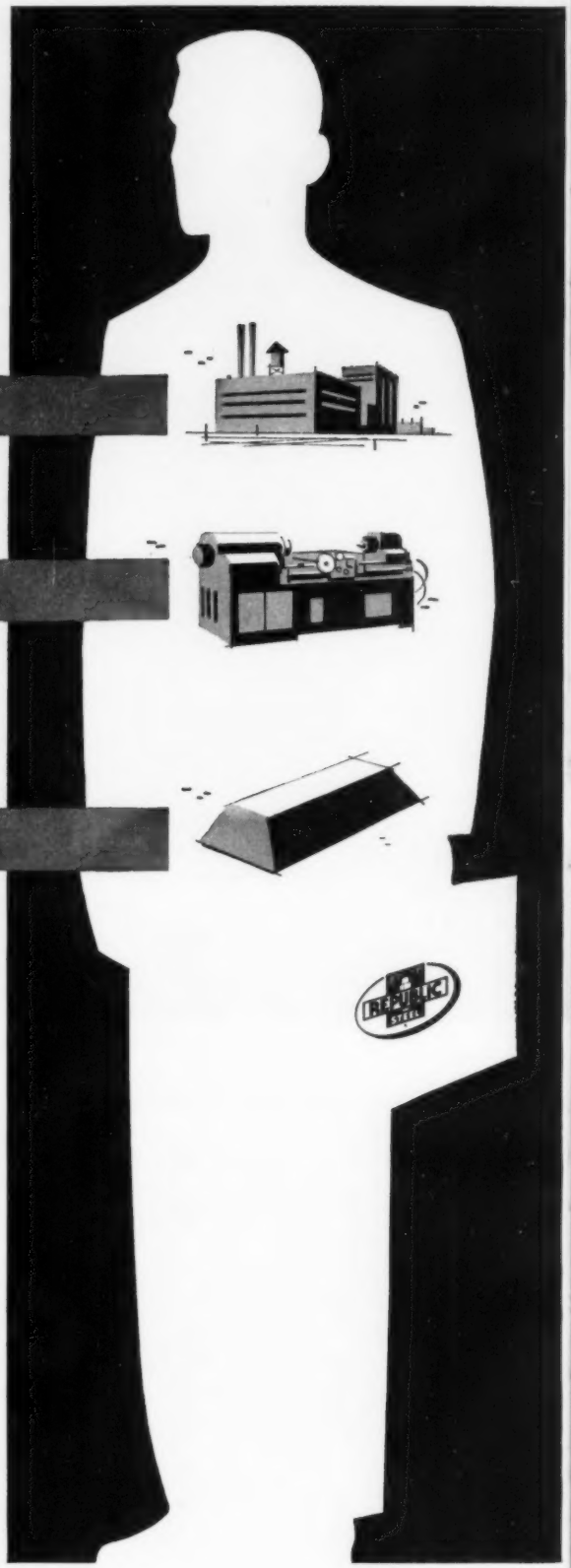

The future's great in a growing America!

And, now is the time to get ready to cash in big. Make those profit moves that will pay off in increased efficiency, higher productivity, lower costs, bigger sales, bigger profit.

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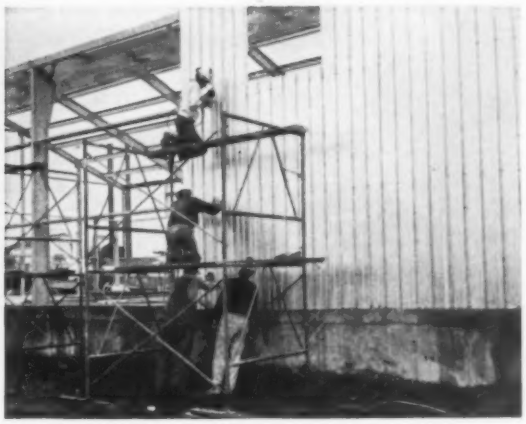
Make your first profit



Nothing is more vital to your operating profit than the proper choice of merchant iron. When your source is Republic, that problem is simplified. Republic offers the industry's most complete line of merchant pig iron—Chateaugay, Northern Basic, Foundry, Bessemer, and Malleable; Southern Basic and Foundry. With this choice, Republic metallurgists are able to recommend the best and most economical grade for your specific job without hesitation or prejudice.

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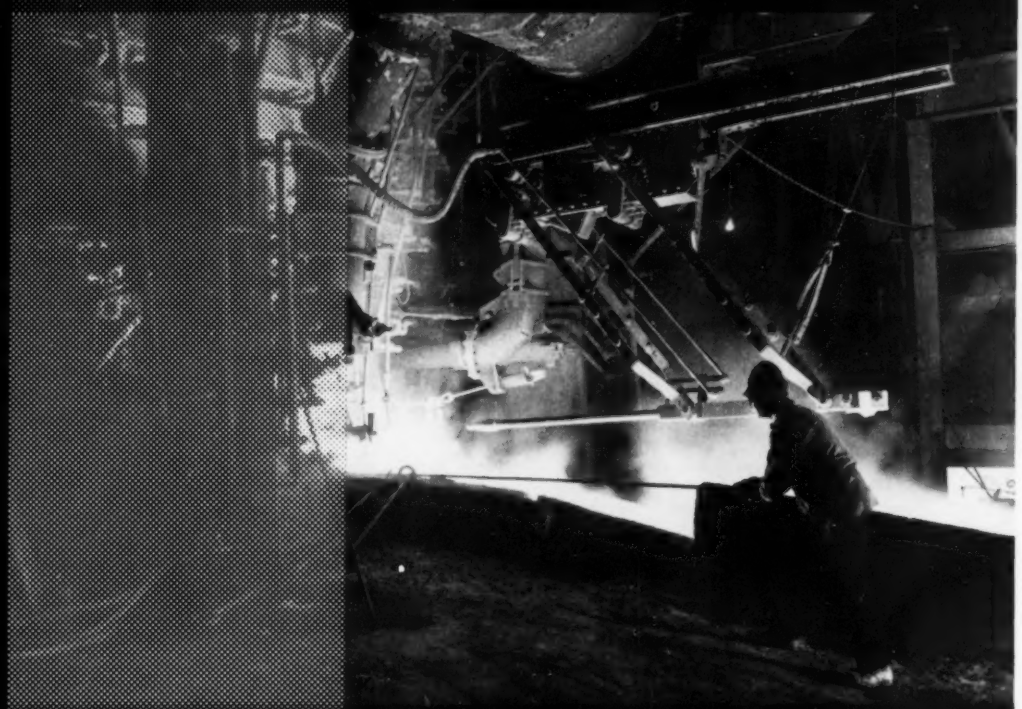

When more than human vision is needed to evaluate the perfection of critical parts, Ansco X-ray films are looked to as the finest for radiographic flaw detection. That's because Ansco specifically designs its emulsions to record high contrast images of the smallest defects in the toughest samples. If you haven't as yet tried an Ansco industrial x-ray film, why not make a test soon?

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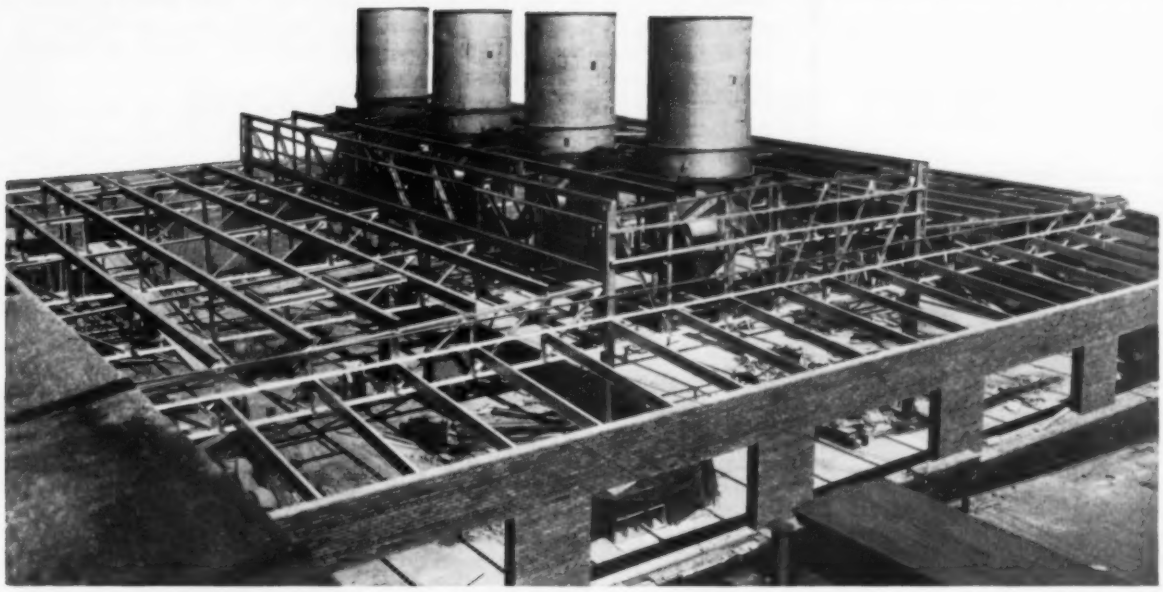

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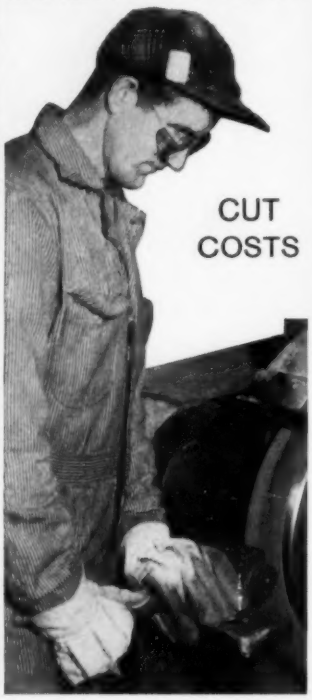

Coarse snagging wheels grind faster, last far longer when dressed regularly with a Desmond Heavy Duty dresser. Even on high-speed resinoid and rubber bonded wheels inexpensive Desmond mechanical dressers expose new, sharp grains and provide a fresh, unloaded surface. Desmond Hex and Huntington dressers are widely used on large and medium size vitrified and silicate wheels. Desmond dressers soon pay for themselves.

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With the Editors

• **Castings Clinics:** Recently I was invited to sit in on the first of a series of castings clinics being staged throughout the country by the Gray Iron Founders' Society. Customers of gray iron foundries are paying for the privilege of sending engineers and buyers for a one-day session on modern gray iron.

During the day, Charles F. Walton, technical director, spoke on What Is Cast iron?; Properties of Gray, Ductile, White and High Alloy Irons; How To Design a Casting; Heat Treatment; and Efficient Machining and Grinding. Richard Meloy, marketing director, discussed What Is a Casting; Specifying and Purchasing; and an idea file for design engineers.

The program was well received by those in attendance, and many interesting and pointed questions were asked and intelligent answers given. These clinics should do much to take information to the places where it will be most valuable in permitting designers to take full advantage of castings potentials.

—o—

Even a Foundry: *France Actuelle*, a fortnightly report for Americans on Modern France and the French Union, for Feb. 1 carried an article entitled "As Graded by French Graduate Students, U. S. Is Efficiency and Hospitality Plus." Two paragraphs on "The U. S. and the French Employee" should be of particular interest to foundrymen:

"Frenchmen, we now believe, love their machinery more than Americans. In American factories, everything is laid out, and the worker only has to do his specialized routine. In France, more individual initiative and decision are left to the employee. Also, in our opinion, he works harder than his American counterpart, and is much more attentive to his machine and his operation—and perhaps prouder of his place in the productive pattern.

"The typical American enterprise has a tremendous concern for its employees' safety. And the workman probably has it easier than our workman. U. S. factories often were air-conditioned, and usually were cleaner than ours. Even a foundry we visited was clean, relatively cool, and completely cleared of smoke."

—o—

A Party: About an hour after Fred J. Walls officially retired as manager of the Detroit office, International Nickel Co., a group of about 200 friends from a wide area gathered at an eating house near 11-Mile Road to do him honor.

It was a fine party and everyone, including Fred, enjoyed it thoroughly. During the evening, Fred's son and son-in-law circulated among

the guests taking colored photographs to record the event for years to come.

To show you how the guest of honor (at left) and the gabby editor looked that night, the accompanying illustration is presented.

—o—

Casting About: For many years Hamilton Foundry & Machine Co., Hamilton, Ohio, has provided excellent communication with its employees through a weekly news letter usually prepared by the company president, Peter E. Rentschler. In addition, the company now has started a new publication, "CASTING ABOUT at Hamilton Foundry," which will be distributed monthly to present the lighter side of subjects of interest to the employees.

A catchy title for the new publication, don't you think?

—o—

Speak Out: In the matter of communications, J. S. Parker, vice president, Relations Services, General Electric Co., recently told the Dayton Chamber of Commerce that business men must speak out on issues that are vital to business and the public interest, whether or not

Sounder, cleaner metal...Higher yield...
Lower scrap loss...
Reduced labor...

with HARBISON-WALKER REFRACTORY GATE and RUNNER TILE

CLEANER METAL

Harbison-Walker Gate and Runner Tile are strong and withstand rapid metal flow without excessive erosion. Their unusual resistance to spalling contributes to the avoidance of inclusions. Cleaner metal is the result.

LESS SCRAP LOSS

Tile of minimum diameters may be used, with considerable reduction of metal in gating systems, and consequent increase in production yield.

REDUCED GAS OCCLUSIONS

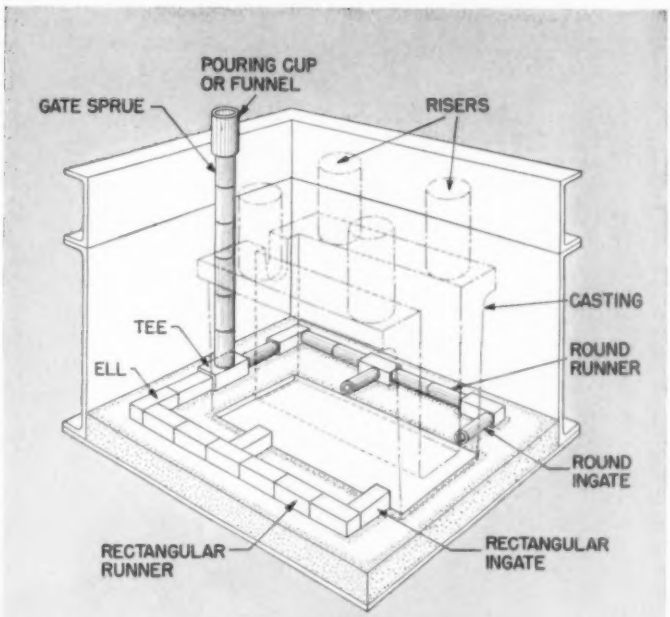
H-W Refractory Tile are much stronger than sand gates, and permit pouring under higher pressures and velocities. With the steady gas-free stream of molten metal, gas occlusions are greatly reduced.

EASIER TO USE

Installation in the mold is easier and faster, and overall cost is less.

TIGHT JOINTS ASSURED

The excellent workmanship of Harbison-Walker Gate and Runner Tile accounts for their good tight fit.



ALL SIZES AND SHAPES NEEDED FOR COMPLETE GATING SYSTEMS

The drawing shows a model arrangement illustrating how various shapes are used. The casting is shown in phantom.

Harbison-Walker Tile are supplied in approximately 200 sizes and shapes. These include cups or funnels, round and square tile with plain or jointed ends, crosses, tees and ells. Many of the more popular sizes are available from stock.

Write for catalog of sizes from which to select those best adapted for your needs.

HARBISON-WALKER REFRACTORIES CO.
AND SUBSIDIARIES
World's Most Complete Refractories Service
***GENERAL OFFICES:* PITTSBURGH 22, PENNSYLVANIA**

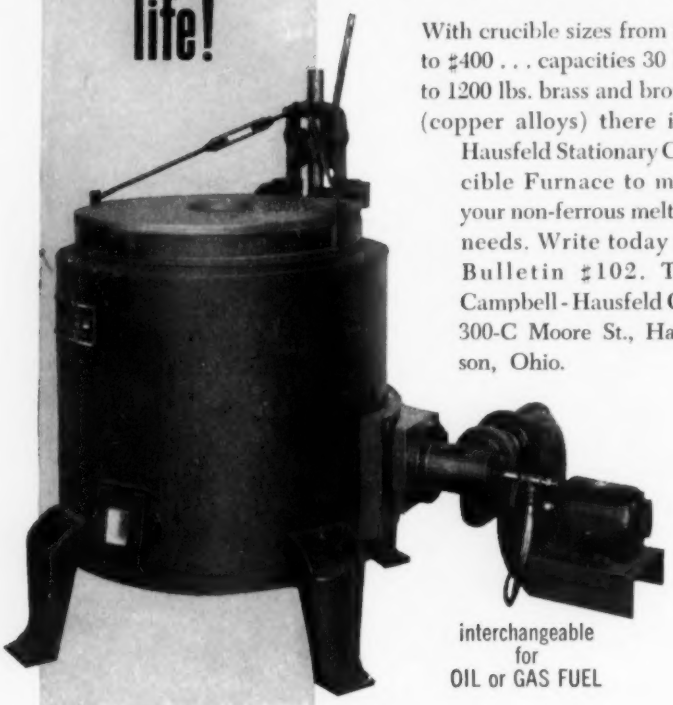
Circle 561 on Page 53

Engineered for longer crucible life!

■ In the Oil Fuel models, as shown, the special higher-pressure mechanical atomizing oil spray—a Hausfeld exclusive – produces a clear, hot flame with minimum cutting action . . . *increases* crucible and lining life.

■ Well insulated lining assures uniform heat dispersal – cuts heat loss and assures many years of fast, efficient melting of brass and bronze.

With crucible sizes from #10 to #400 . . . capacities 30 lbs. to 1200 lbs. brass and bronze (copper alloys) there is a Hausfeld Stationary Crucible Furnace to meet your non-ferrous melting needs. Write today for Bulletin #102. The Campbell-Hausfeld Co., 300-C Moore St., Harrison, Ohio.



interchangeable for OIL or GAS FUEL

Hausfeld STATIONARY CRUCIBLE FURNACES

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

they are controversial. He said, "By speaking out I mean spoken and written communications, through all media, to employees, share owners, customers, other business men, and community leaders. We must somehow make plain, plainer than any of us have been able to do so far, where jobs and values come from, what makes them continue to be available, what makes them go away, what are the facts of life concerning money and inflation, and that there is no such thing as a 'free lunch' or a free government 'handout.'"

—o—

Training: Late last year the Bureau of Apprenticeship and Training, U. S. Department of Labor, held a meeting of the National Foundry Advisory Committee in Washington. The session was devoted to a review of the two surveys which have been completed (FOUNDRY, July, 1957, p. 94; July, 1958, p. 110).

It was recommended that the bureau undertake a program to help smaller foundries with their training programs, that pilot studies be made in three or four areas to determine the type of training needed, with particular emphasis on the technical phases, and that representatives of the Bureau of Apprenticeship & Training work with educational committees of AFS chapters in these studies.

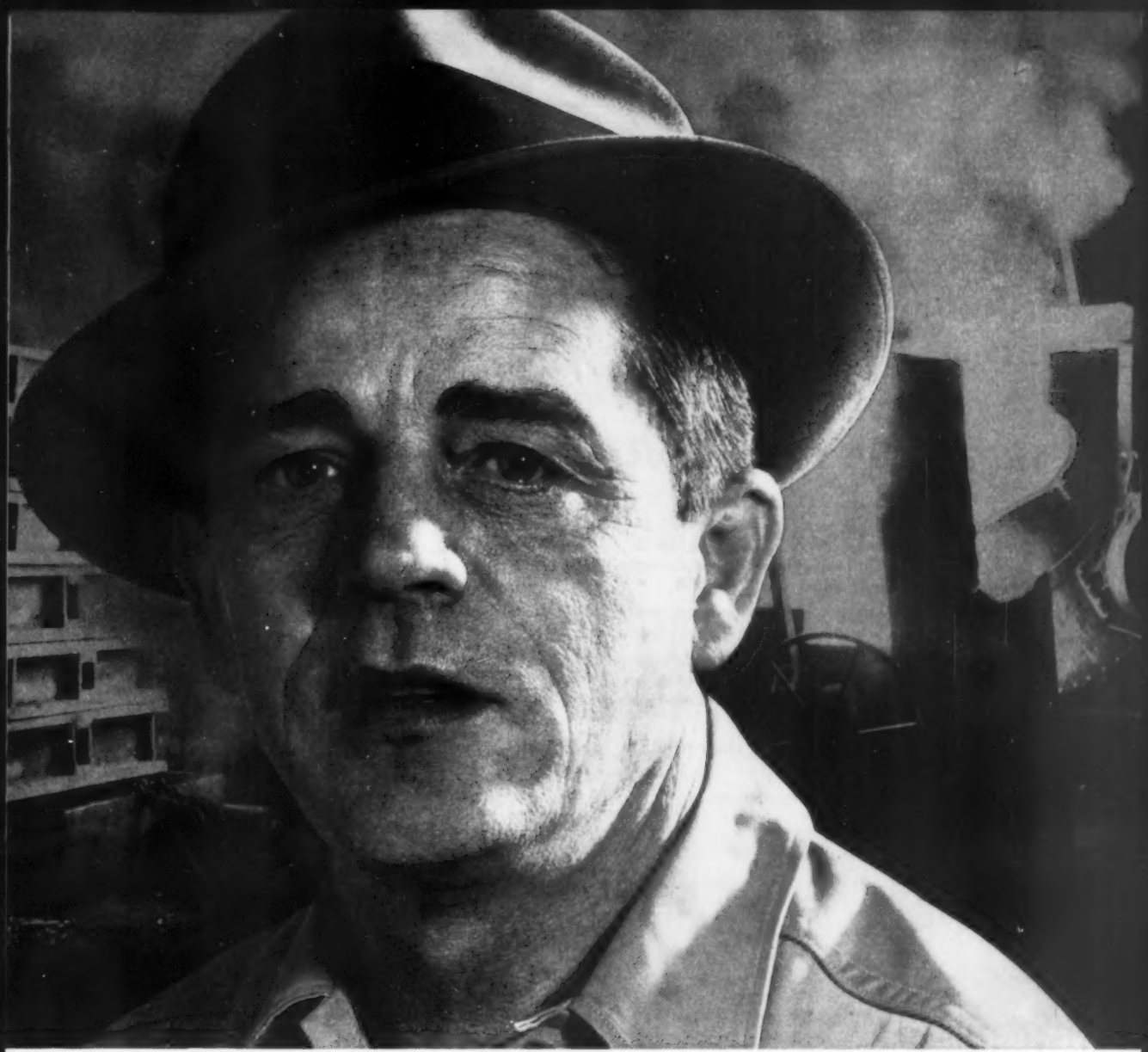
The local organization would study types of training needed, recommend methods of training and provide general stimulation and coordination of training programs. The local group would avail itself of the services of the AFS Training & Research Institute, vocational schools, colleges, the bureau, and any other agency that could assist.

—o—

Honored: Our congratulations to John D. Wise, district manager, Pangborn Corp., Pittsburgh, who was initiated into the Mississippi State University Chapter of Tau Beta Pi recently. As pointed out in *The Reflection*, the college newspaper, "Tau Beta Pi is a national engineering honor society that recognizes distinguished scholarship and exemplary character in undergraduate engineers and attainments by alumni in the field of engineering."

F.G.S.

Circle 562 on Page 53



"It's the lowest cost alloy for ductile iron"

Foundries find that ELECTROMET magnesium-ferrosilicon is an economical, convenient source of magnesium for ductile iron. When added to a suitable composition, the alloy gives maximum ductility by promoting a matrix of soft ferrite. By adjusting the analysis, it can easily be used in high-strength irons having somewhat lower ductility.

Magnesium-ferrosilicon is available in grades with or without cerium. Cerium (0.5 or 2%) helps control unwanted residual elements which hinder the formation of spheroidal graphite. For further information and technical assistance, contact your UNION CARBIDE METALS representative.

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Write for the folder, "Magnesium-Ferrosilicon for Ductile Iron."

UNION CARBIDE METALS

Electromet *Brand Ferroalloys and other Metallurgical Products*

The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Circle 563 on Page 53

COLEMAN OVENS

reduce waste . . . lower costs

in every type of foundry

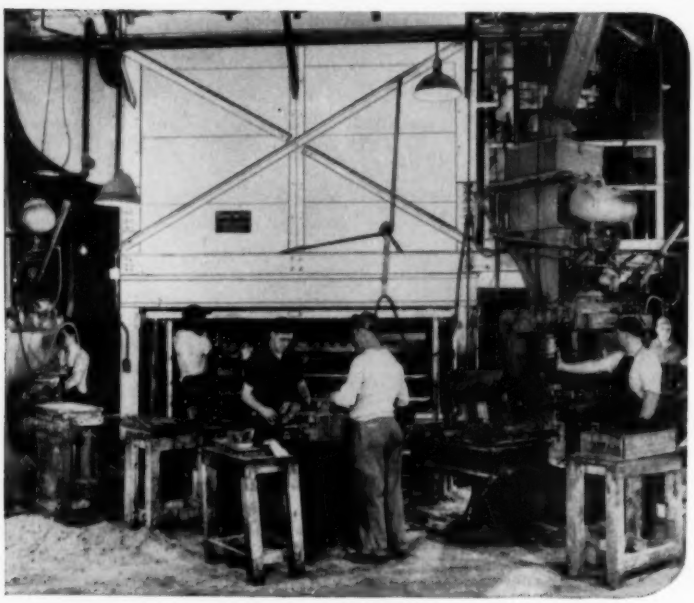
You can reduce casting scrap . . . CUT YOUR LABOR, MATERIAL AND FUEL COSTS by baking cores and drying molds in Coleman Ovens. Small and large foundries alike find that Coleman Ovens are vital to better quality castings and increased profits.

Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.

Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work—grey iron, malleable, steel, alloy, brass, aluminum and magnesium.

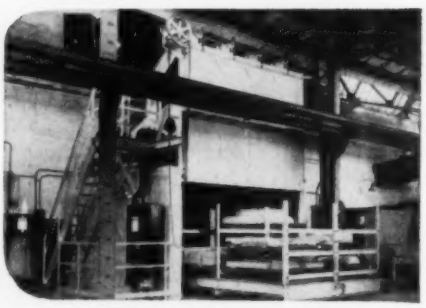
Profit by this experience — let us recommend, at no obligation, the Coleman Oven for your needs.

Write for Bulletin 54

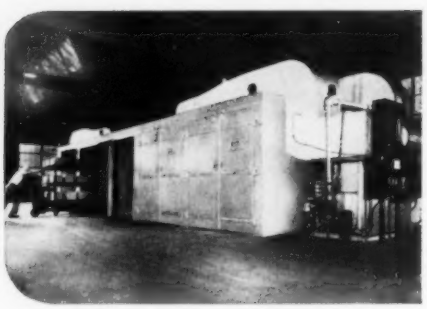


Coleman Tower® Oven

Coleman Dielectric Core Oven



Coleman Car-Type Oven



Coleman Transrack Ovens

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Circle 564 on Page 53

Circle 563 on Page 53

ANNOUNCING:

THE NEWEST SOURCE OF QUALITY ELECTRIC ARC FURNACE STEEL SHOT AND STEEL GRIT IN THE INDUSTRY

Our completely new plant is designed and engineered to give you the fastest delivery on Quality Electric Steel Shot and Grit. You can now secure the quality you require and get the service you want from the most advanced electric steel shot and grit source in the industry. Our all new plant in the heart of the steel producing center of the world is the result of years of planning by specialists to provide a new facility for the highest quality shot and grit obtainable.

"FOR AN ABRASIVE THAT'S REAL . . . *USE DURASTEEL*"

DURASTEEL ABRASIVE COMPANY

2601 SMALLMAN STREET — PITTSBURGH 22, PENNSYLVANIA

Distributorships Available

Circle 565 on Page 53

NOW! save up to 50%

in BINDER COST with

NEW STEINEX

SLOWER-HARDENING BINDER

Specifically designed for BENCH WORK and CORE BLOWER use

CarVer FOUNDRY PRODUCTS
Muscatine, Iowa

Please rush information and prices on New Steinex binder ☐ Krauss Core Vents ☐

NAME TITLE

FOUNDRY

CITY STATE

CALENDAR of Meetings

March 9-10 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

March 13-14 — California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

March 16-20—American Society for Metals, plus other technical groups, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles.

March 17-19—Investment Casting Institute, technical session, Santa Monica, Calif.

March 17-19—National Association of Corrosion Engineers, annual show and conference, Sherman Hotel, Chicago.

March 18-19—Foundry Educational Foundation, annual College-Industry Conference, Statler-Hilton Hotel, Cleveland.

March 19-20—Texas Regional Foundry Conference, Menger Hotel, San Antonio, Tex.

March 20—National Association of Corrosion Engineers, 15th annual conference, Chicago.

April 8-9—Malleable Founders' Society, Market Development Conference, Sheraton-Cleveland Hotel, Cleveland.

April 13-17—AFS Castings Congress & Engineered Castings Show, Hotels Sherman and Morrison, Chicago.

April 16—Foundry Section, Magnesium Association, sectional meeting, Congress Hotel, Chicago.

May 13-15—National Industrial Sand Association, annual meeting, Homestead, Hot Springs, Va.

May 25-26—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

May 25-27—American Society for Quality Control, annual convention, Public Hall, Cleveland.

May 25-28—Design Engineering Show, sponsored by machine design division, American Society of Mechanical Engineers, Convention Hall, Philadelphia.

June 9-12—Material Handling Institute, 1959 Exposition, Public Hall, Cleveland.

June 21-26—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 25-27—Penn State Foundry Conference, Pennsylvania State University, University Park, Pa.

Sept. 21-22—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 21-25—Instrument Society of America, annual Instrument-Automation Conference and Exhibit, International Amphitheatre, Chicago.

Sept. 24-25—Missouri Valley Regional Foundry Conference, Missouri School of Mines & Metallurgy, Rolla, Mo.

Oct. 4-10 — International Foundry Congress, organized by Spanish Institute of Iron & Steel, Madrid, Spain.

Oct. 7-9—Gray Iron Founders' Society, annual meeting, Fairmont Hotel, San Francisco.

Oct. 10-13 — Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

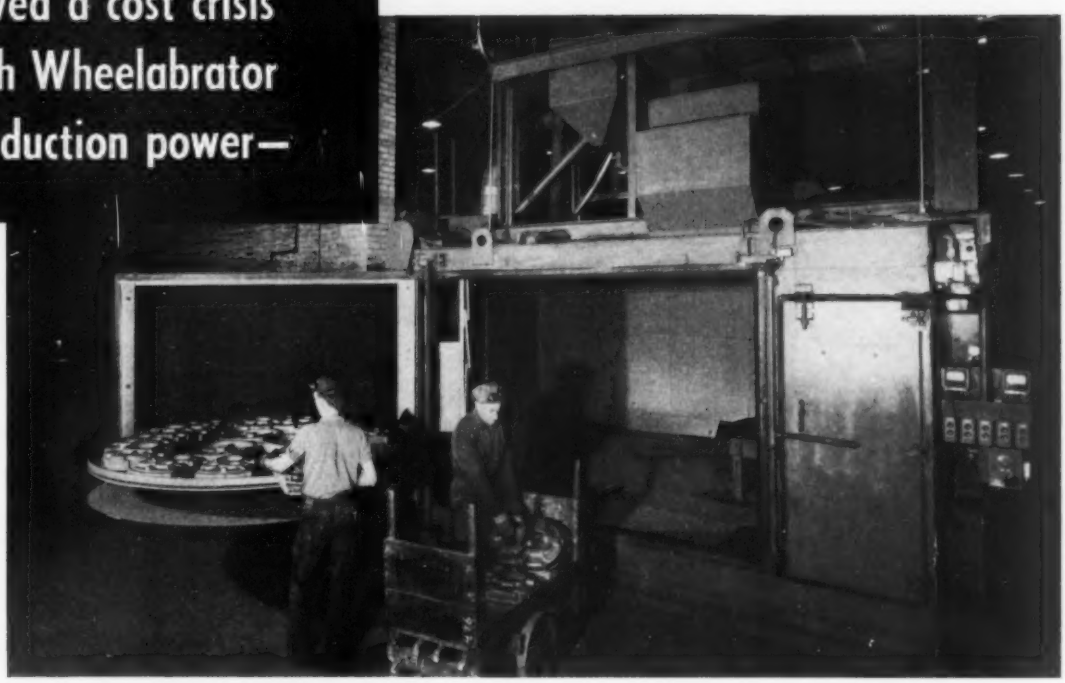
Oct. 15-17—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Nov. 5-6—National Foundry Association, 61st annual meeting, Roosevelt Hotel, New York.

Nov. 16-20—International Automation Congress & Exposition, New York Trade Show Building, New York.

Dec. 2—Electric Overhead Crane Institute, annual meeting, Carlton House, Pittsburgh.

how Dodge Mfg. Corp. solved a cost crisis with Wheelabrator production power—



an open door to cost reduction

This Wheelabrator Swing Table coped with a cost crisis in the cleaning room at Dodge Manufacturing Corp., Mishawaka, Indiana. After having modernized other departments in its large gray iron foundry, this progressive firm faced a combination of problems in its airblast cleaning operations.

Snails-pace airblast room cleaning often delayed production. Even with three operators, cleaning production could not keep pace with other departments. Overtime work was common. And, in spite of the excessive labor costs, airblast cleaning quality did not measure up to the Dodge standards of inspection.

Installation of the Wheelabrator airless abrasive blast cleaning machine, with auxiliary spot air blast facilities, however, turned the problem into profit. The Swing Table easily handles loads weighing up to 10,000 lbs. Easy overhead loading and unloading speeds production, makes work handling highly efficient. Mixed loads can be cleaned at one time, assuring full-time production.

The airblast room, always a dirty, uncomfortable operation, was eliminated, and with it the need to buy a new air compressor. The prodigious production power of the Wheelabrator slashed labor costs, reduced the work force one third, and entirely eliminated overtime. Cleaning quality far superior to anything previously obtained, is achieved in a fraction of the former time. Modernizing for cost reduction with Wheelabrator equipment again has paid off handsomely.

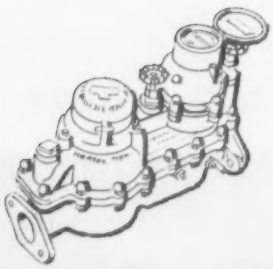
For more information, write for Bulletin 119-D, illustrating cost-saving applications of Swing Table equipment.

WHEELABRATOR
CORPORATION

505 South Byrkit Street **Mishawaka, Indiana**
Canadian Offices: Scarborough (Toronto) — Montreal

WORLD'S LARGEST MANUFACTURERS OF AIRLESS BLAST CLEANING EQUIPMENT AND STEEL ABRASIVES

Circle 567 on Page 53



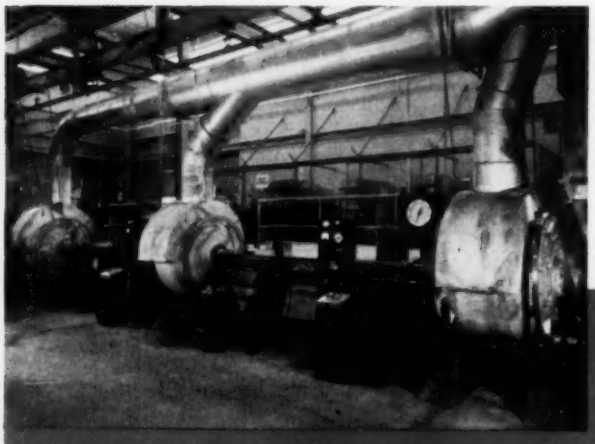
Leading water meter manufacturer installs DETROITS to cut operating costs

"The Detroit Electric Furnaces we recently installed are giving the fast melts and performance required. We expect even greater savings as we go along.

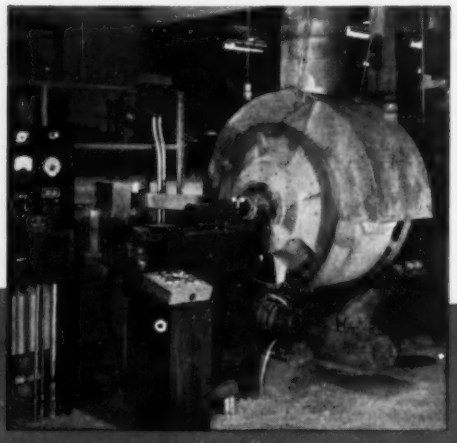
"These units give us new flexibility in our daily operations and control we never had in the past," says Charles M. Pate, foundry superintendent of the Hersey Manufacturing Company of Dedham, Massachusetts.

Hersey Manufacturing Company, one of the oldest leading manufacturers of water meters in the country, recently converted to three Detroit rocking electric furnaces as a step in reducing its foundry operation costs. Although it is too early for a complete tabulation of results, Hersey reports an appreciable savings in fuel cost, melt loss, maintenance and manpower. Hersey expects the Detroits to pay for themselves in a relatively short time—and its operating costs on the whole to be much lower now that Detroits are on the job.

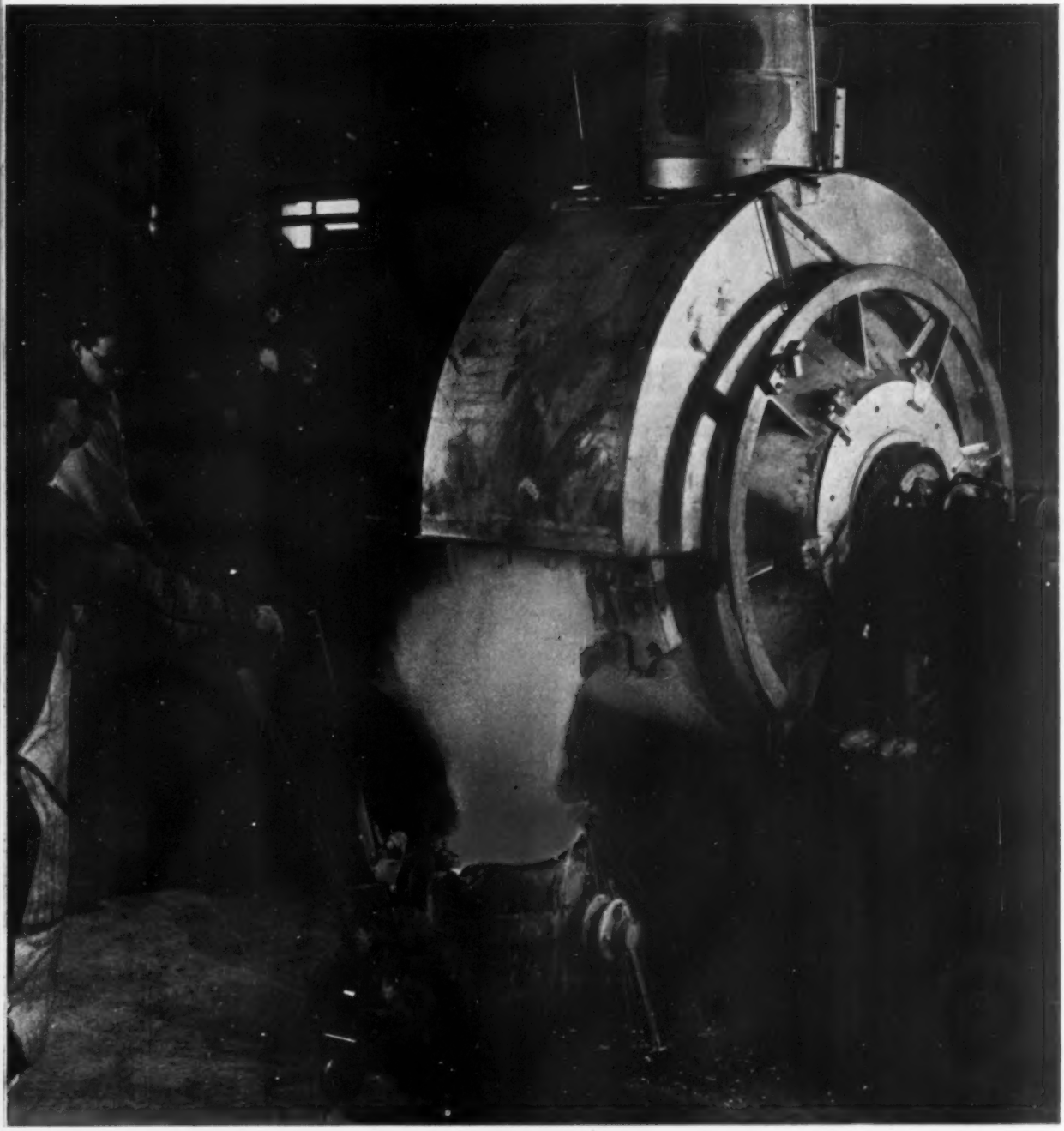
As Hersey is demonstrating, the place to cut foundry costs is right where they start—at the furnace. Send us your requirements. We'll gladly show you how Detroit Electric Furnaces cut operating costs.



A battery of three 700 lb., 175 KW Detroits give Hersey a steady stream of fast melts. Continuous rocking action washes the metal over the refractory, fully utilizing heat. This motion also assures complete homogeneity. Automatic controls accurately repeat the cycle time after time.



Here is one of the three automatically controlled "rocking action" Detroit LFYP's installed by Hersey. Angle of rock can be set for any desired length of time. Electrode controls are also automatic.



DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company
Bay City, Michigan

Foreign Representatives: In BRAZIL—Equipamentos Industrias, "Elsa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castelvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Provedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

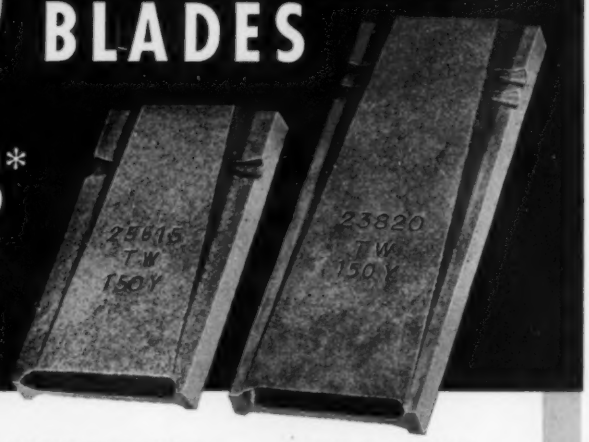
Circle 568 on Page 53

TISCO® REPLACEMENT BLADES

to fit

WHEELABRATORS*

5 WAYS BETTER



TISCO Replacement Blade — Manufacturers part numbers 36473 and 154069.

TISCO Replacement Blade — Manufacturers part numbers 47130 and 143600.

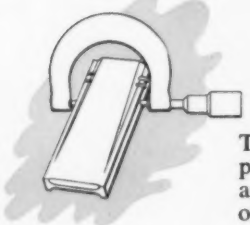
TISCO 150-Y High Chrome Alloy blades are "super-hard" for severe abrasion.

THICKER

Thick TISCO blades take constant abrasion in stride, outlast competitive blades.

LONGER-WEAR

TISCO blades outwear others 6 to 1, save money in the same ratio!



ACCURATE

To insure quick, easy replacement TISCO blades are ground to dimensions of greatest accuracy.

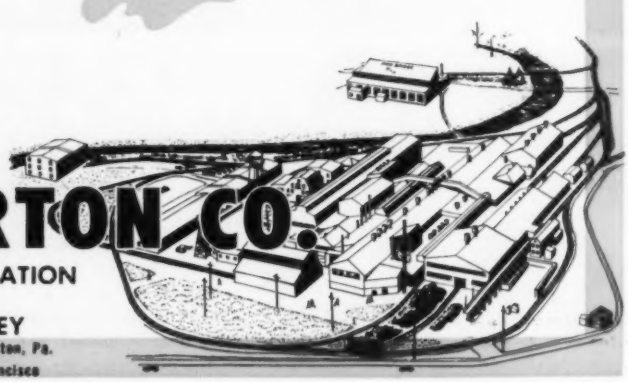
SMOOTHER

Smoother wearing surfaces on all TISCO blades will not develop rough spots as ordinary blades often do. TISCO smoothness inhibits pitting, too.

BALANCED SETS

Precision balanced sets provide customers with uniform blades — no "mixed" sets are shipped.

* Reg. U. S. Pat. off. Wheelabrator Corporation



TAYLOR-WHARTON CO.

DIVISION OF HARSCO CORPORATION

Established 1742

HIGH BRIDGE 7, NEW JERSEY

PLANTS: Cincinnati, O. — Birmingham, Ala. — Easton, Pa.

SALES OFFICES: New York — Chicago — San Francisco

Circle 569 on Page 53

YOU'LL DO A BETTER JOB

with H. V. ADAMS DESIGNED

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.

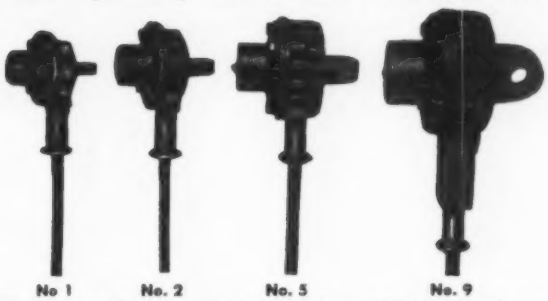
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- SPEED
- ECONOMY
- SAFETY
- LONGER LIFE
- GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

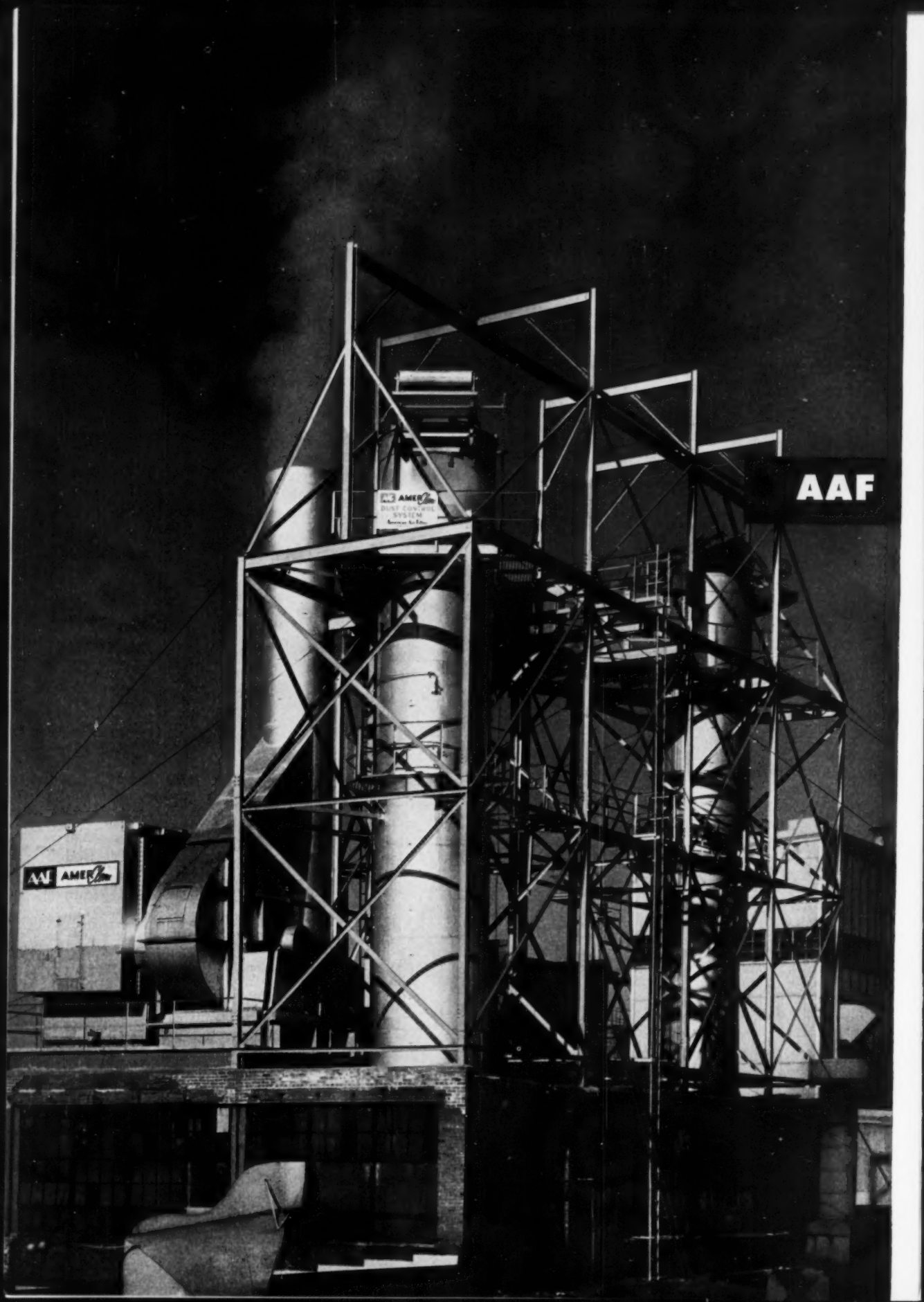
ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

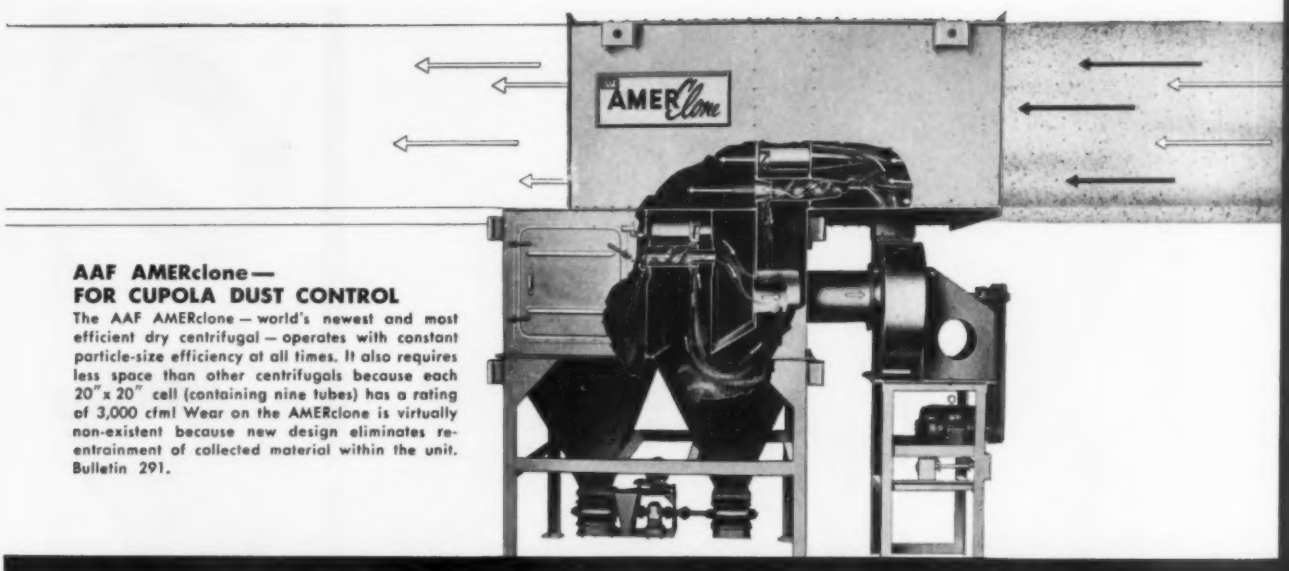
FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

Circle 570 on Page 53


AAF
AAF AMERAir
AMERAir
DUST CONTROL
SYSTEM



AAF AMERclone—
FOR CUPOLA DUST CONTROL

The AAF AMERclone — world's newest and most efficient dry centrifugal — operates with constant particle-size efficiency at all times. It also requires less space than other centrifugals because each 20" x 20" cell (containing nine tubes) has a rating of 3,000 cfm! Wear on the AMERclone is virtually non-existent because new design eliminates re-entrainment of collected material within the unit. Bulletin 291.

CONTROLS DUST AT GOLDEN FOUNDRY

- **AAF AMERclone collects 15 lbs. of dust per ton of melt in CUPOLA!**
- **TYPE N ROTO-CLONES keep SAND CONDITIONING SYSTEM dust-free!**
- **TYPE D ROTO-CLONES take the grime out of GRINDING!**

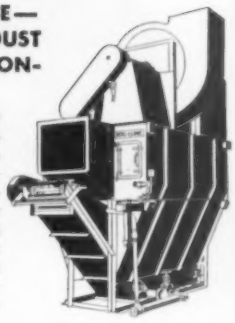
Golden Foundry, a gray iron foundry in Columbus, Indiana, is a good example of an alert, neighborhood-conscious foundry using the most modern methods for combatting dangerous dust.

Golden's cupola system (including a No. 8 and a No. 10 cupola) is melting 17 tons of iron per hour. For every ton melted, the AAF AMERclone is removing 15 lbs. of dust! Here are the dividends:

- **Eliminates neighborhood complaints.**
- **Eliminates damage to cars in parking lot.**
- **Saves insurance rates.**
- **Increases visibility for workers on charging floor.**
- **Cuts foundry maintenance costs, especially roof maintenance.**

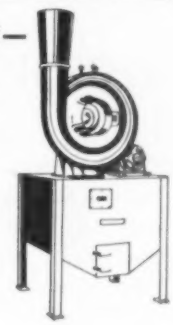
AMERclone serves two cupolas alternately, permitting full-time use of equipment. It is collecting fly ash, iron oxide, silica and other contaminants which otherwise would become an air pollution and maintenance problem. AMERclone traps the particles that cinder catches miss . . . the *small* particles that create *big* problems. American Air Filter Company, Inc., 266 Central Avenue, Louisville 8, Ky. In Canada: American Air Filter of Canada, Ltd., Montreal, P. Q.

TYPE N ROTO-CLONE—
FOR CONTROL OF DUST ON SAND CONDITIONING SYSTEMS



The high cleaning efficiency of AAF's wet-collecting Type N ROTO-CLONE results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. There's no secondary dust problem with the Type N, and its compact design makes for important space savings. Bulletin 277.

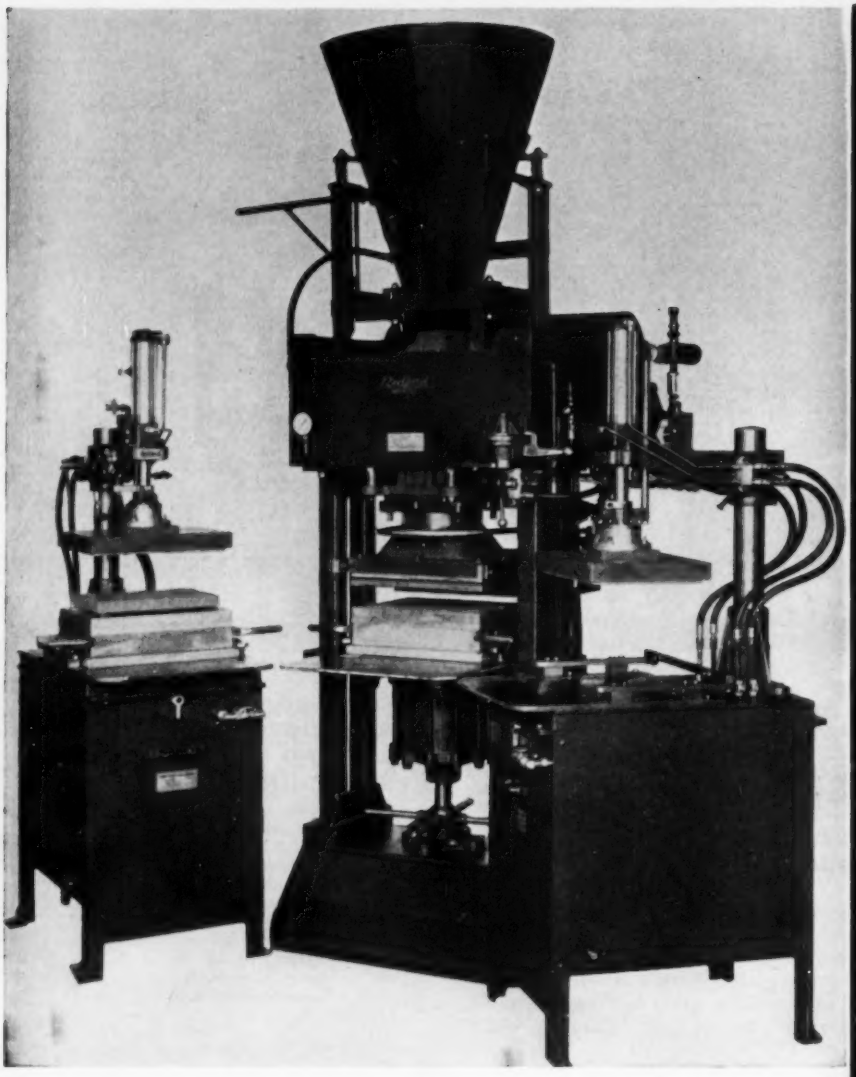
TYPE D ROTO-CLONE—
FOR CONTROL OF GRINDING DUST



AAF's dry-collecting Type D draws in the dust-laden air, delivers the collected material to the storage hopper, and expels the clean air—all in a single operation with only one moving part: the impeller. Exhauster and separator are combined in a compact, self-contained unit. Bulletin 272.

AAF American Air Filter
BETTER AIR IS OUR BUSINESS

Circle 571 on Page 53



REDFORD CO_2 MOLD MAKING EQUIPMENT

Here is a proven way of applying the CO_2 process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.

Redford **IRON & EQUIPMENT CO.**
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

TYPICAL CO_2 MOLD CASTINGS

½ Actual Size

Modern Workhorse of the foundry

Durability for heaviest duty! Dependability for long lasting service!

The strength and durability of Logan Conveyors are a direct result of custom design, quality material, plus craftsmanship that has made Logan Conveyors famous in the foundries of America for more than two generations.

Because of the many types of Logan Conveyor units available, you are always assured of having the right equipment for the specific job required. Long life and trouble-free operation are the natural result of selecting the proper Logan Conveyor for each different materials handling function in your plant. Logan Conveyors deliver the day-in, day-out dependability that results in peak load capacity with maximum economy of operation. From cupola to shake-out, storage or shipping, Logan Conveyors are built to take it — *and then some!*

If you have a problem in the handling and conveying of your materials, why not talk to your Logan engineer? A letter or phone call will bring him to you. Write today for the complete Logan Conveyor Catalog 16.

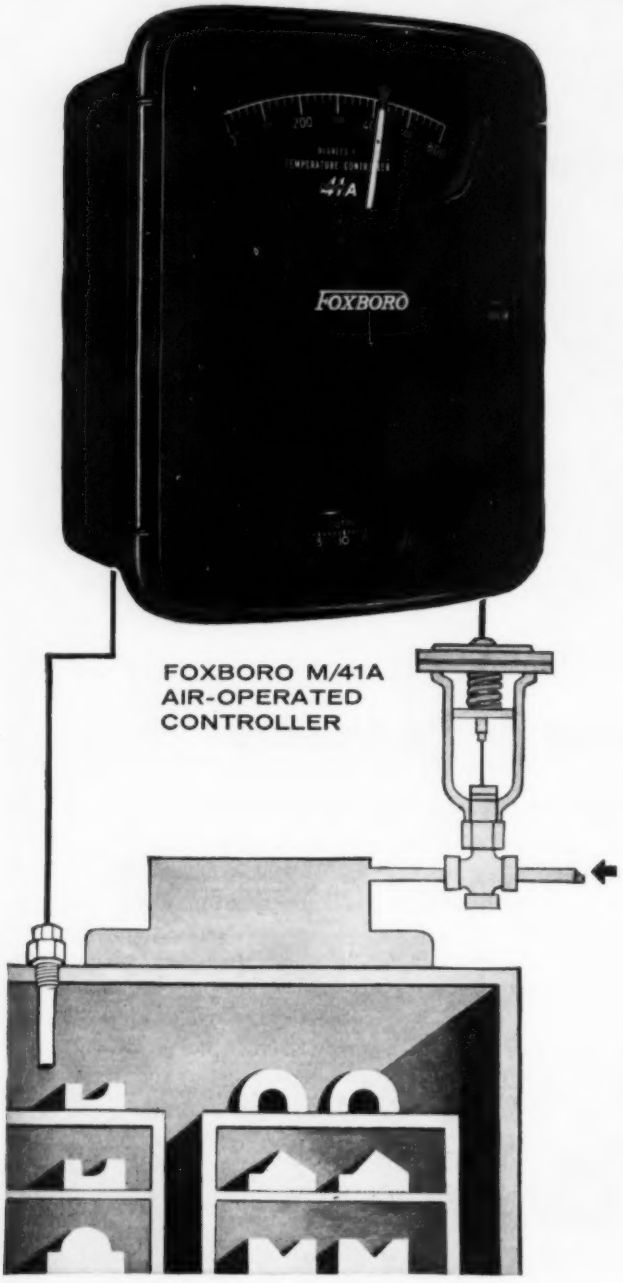
Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

Circle 573 on Page 53

WHY RISK CORE FAILURES?

... meet critical baking requirements precisely



FOXBORO M/41A
AIR-OPERATED
CONTROLLER

WITH FOXBORO M/41 CORE OVEN TEMPERATURE CONTROL

You can be *sure* that you are maintaining the critical baking temperatures which today's complex sand mixes require . . . when your core oven is equipped with the Foxboro M/41. There's no guesswork: This Controller's large indicating scale continuously shows "set" temperature and actual oven temperature . . . proves to the operator that cores are getting the specified bake *precisely*. And models are available for every type of heating system.

Both the M/41A (air-operated) and the M/41E (electric) sense the smallest changes in temperature . . . both respond with positive-power control action. Both are high-accuracy devices, built for years of dependable, trouble-free service.

Protect the quality of your core production with quality core oven control. Specify Foxboro M/41 Temperature Control (air-operated or electric-operated) on new equipment, or install easily and quickly on your present ovens. For detailed information, write for Bulletin 5A-13A. **The Foxboro Company, *323* Neponset Avenue, Foxboro, Massachusetts.**

FOXBORO

REG. U.S. PAT OFF.

COMPLETE FOUNDRY INSTRUMENTATION

Circle 574 on Page 53

I'm *Soffel's* Red Devil Thermotomic HoTop

I'll pump all the metal you can pour... 24 hours a day... the hotter—the better!

A demonstration will show you how effectively you can cut costs & increase yields

Reduce the size of your heads and let Soffel's Red Devil Thermotomic Hotop keep that reduced amount of metal in the heads liquid so you will gain *more* sound, shrink-free castings from every ladle of metal poured.

Soffel's Red Devil Thermotomic Hotop will *not* contaminate any non-ferrous alloy, is *not* premium priced, requires *no* special engineering personnel, definitely *will* reduce costs and increase yield. Ask for demonstration today.

Distributors

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6323 So. Central Avenue

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Sinclair Brandt Equip. & Supply Co.
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PITTSBURGH METALS PURIFYING CO., INC.
Phone: NAtional 5-5800 • Mars, Penna.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Circle 575 on Page 53

32 ALUNDUM Abrasive for your gray iron castings*

44 ALUNDUM Abrasive for your steel castings*

Here's how Norton keeps

"Making better products... to make your products better"

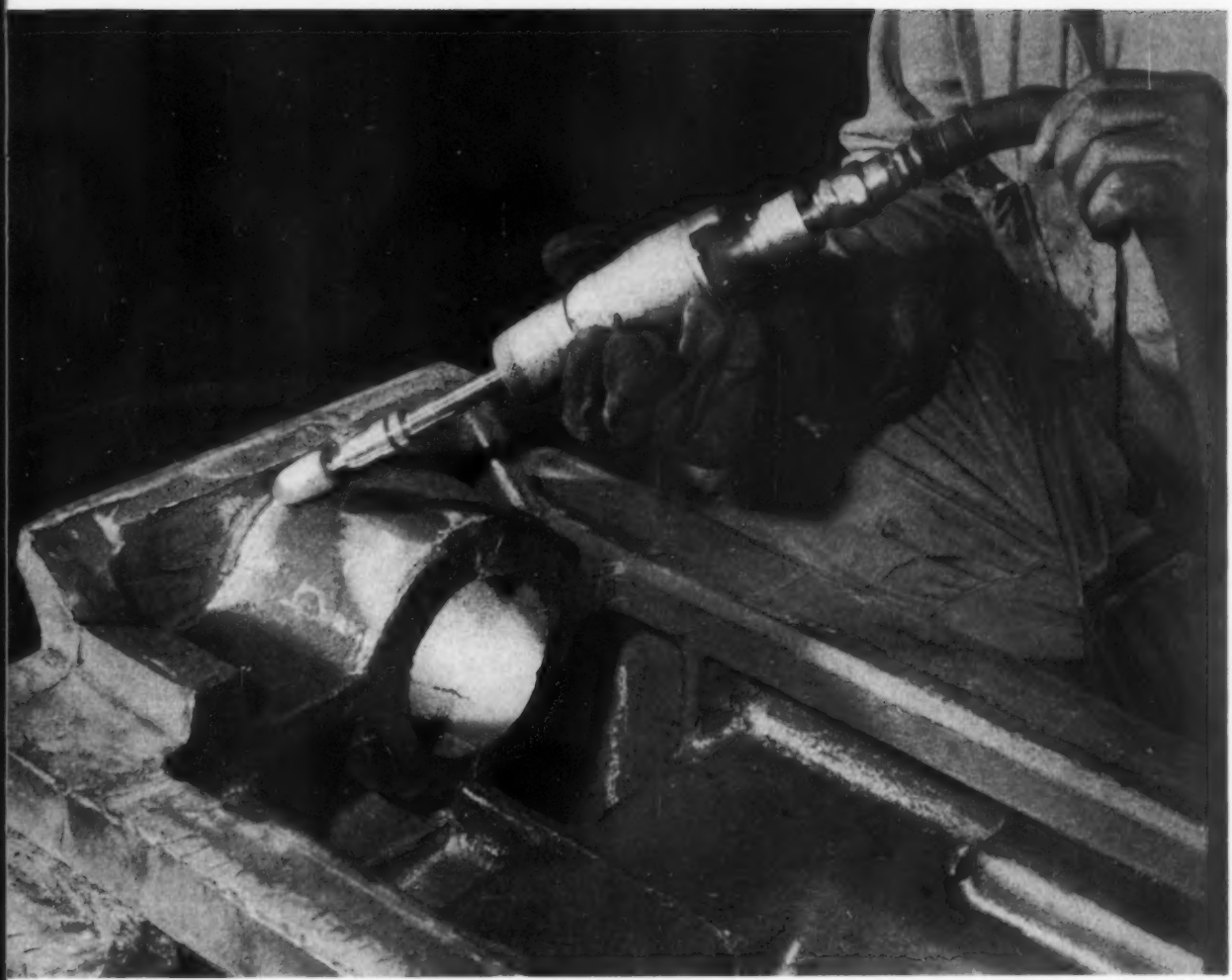
In snagging, as throughout their entire job range, Norton mounted wheels are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing — besides giving you the fastest cutting rate, with a marked increase of stock removed per wheel.

These advantages are the natural results of Norton Company's long experience in engineering mounted wheels for best performance on every application — such as tool and die finishing, metal pattern work and all kinds of rough grinding.

For steel castings, wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are the most efficient abrasive-bond-mounting combination you can get. And they're best for weld grinding, too.

For gray iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

Norton mounted wheels have already proved their cost-cutting, product-improving ability. "There has never been anything like them for speed and economy in our snagging," says the foreman of a leading foundry.



METAL-MOUNTING — *Another Norton Exclusive — You throw nothing away but the mandrel!*

Norton does it again! The mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* No waste . . . all work! This radically improved method of locking the abrasive body to the mandrel is used on mounted wheels in most sizes and shapes, 5/16" diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

Every Norton mounted wheel is accurately trued *after mounting* on rust-proof stainless steel mandrels. Developed to increase the time-and-money-saving "Touch of Gold," Norton mounted wheels are stocked in approximately 200 standard shapes and sizes. See your Norton Distributor for prompt deliveries. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON ABRASIVES

W-1888

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 576 on Page 53

I keep an open mind...try new sand additives when they come along, especially when they promise better castings or lower cost. Any new material that sounds promising gets a fair shake in my foundry. What burns me is to get low quality material or an off-standard batch—means too much readjustment all down the line. There's too much off-standard lately, so—

I QUIT!

(Fooling Around)

make me up a MIXED TRUCKLOAD of old reliable: Green Bond BENTONITE, ADM-Federal SAND STABILIZER, and Crown Hill SEA COAL

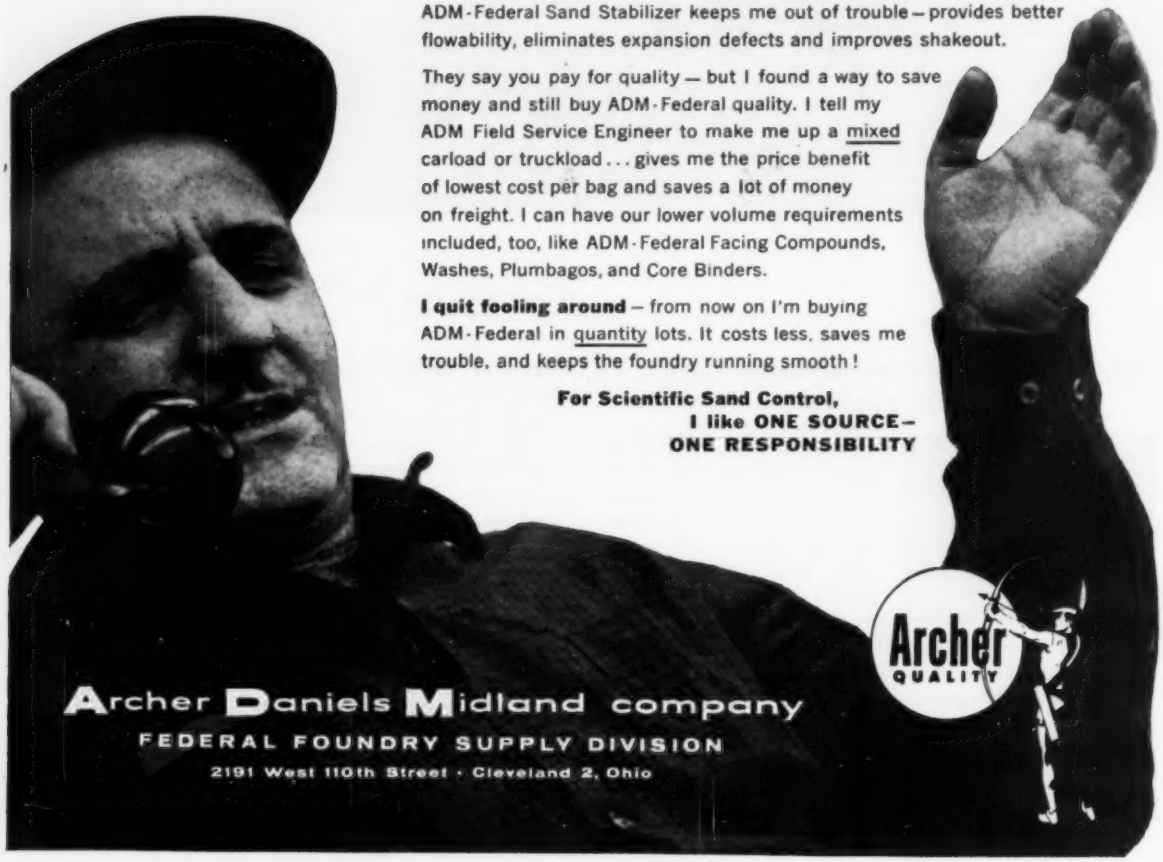
When I use these dependable ADM-Federal products, I know from experience I have perfect sand control. Their absolute uniformity from shipment to shipment assures me of successful duplication of tested sand mixes.

GREEN BOND, for instance, the purest of the western bentonites, is unmatched for bonding power and helps me get the permeability I need. I can buy CROWN HILL Sea Coal in any grind, and I know it is lowest in ash and sulphur content, highest in volatile, combustible material. ADM-Federal Sand Stabilizer keeps me out of trouble—provides better flowability, eliminates expansion defects and improves shakeout.

They say you pay for quality—but I found a way to save money and still buy ADM-Federal quality. I tell my ADM Field Service Engineer to make me up a mixed carload or truckload... gives me the price benefit of lowest cost per bag and saves a lot of money on freight. I can have our lower volume requirements included, too, like ADM-Federal Facing Compounds, Washes, Plumbagos, and Core Binders.

I quit fooling around—from now on I'm buying ADM-Federal in quantity lots. It costs less, saves me trouble, and keeps the foundry running smooth!

For Scientific Sand Control,
I like ONE SOURCE—
ONE RESPONSIBILITY



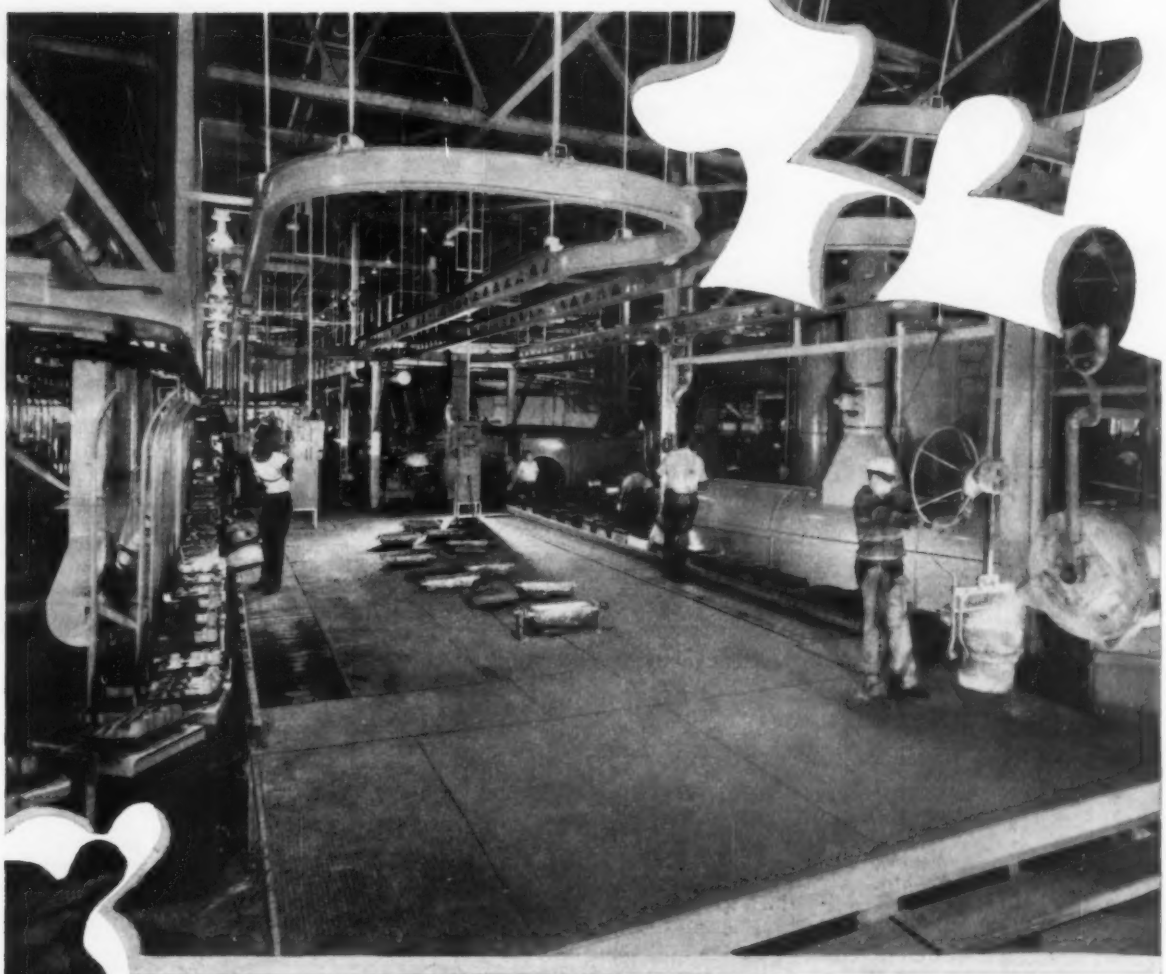
Archer Daniels Midland company
FEDERAL FOUNDRY SUPPLY DIVISION
2191 West 110th Street · Cleveland 2, Ohio

Circle 577 on Page 53

Set your own pace to modernization---

mechanize step by step

with LINK-BELT equipment



SMALL or large foundries can modernize systematically with the help of Link-Belt planning . . . perfected through 50 years of serving foundries. Industry's broadest line of conveyors and preparation machinery allows you to add equipment where it's needed most . . . *piece by piece at your own pace.*

Start anywhere! Whether it's the handling of sand, cores, molds, castings . . . or a complete system—Link-Belt will furnish and install equipment that results in lower costs, more efficient operation, better working conditions.

For best results, step-by-step mechanization requires a sound, long-range program. Our foundry specialists will help you with it, will gladly counsel with you or your consultants. Call your nearest Link-Belt office. Ask, too, for Book 2423.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15.014

Circle 578 on Page 53

Let's CUT COSTS

on these Secondary Operations

DRILLING
REAMING
TAPPING
TURNING
MARKING
PUNCHING
GRINDING
ROUTING
SAWING
THREADING

High cost second operations can kill first operation profits. If you perform any of the above secondary operations, better take a critical look at how you do it. There may be cost saving opportunities you've overlooked.

If any one of them involves hand feeding of parts or tools—hand clamping—or mechanical means of performing push, pull or lift motions—The Bellows Co. can save you money.

The Bellows Air Motor and the numerous Bellows packaged pneumatic work units can, in a few minutes, transform hand operated machines and machine tools into fast automatic or semi-automatic production units. They are inexpensive to buy—your own tool room can install them quickly.

Here's how to start—

Write for these two booklets. Bulletin ML-3 and BM-25 will give you a quick picture of what others are doing—of what you can do—in cutting second operation costs. Write Dept. FO359, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

894-B

Circle 579 on Page 53

Late News

EQUIPMENT SALES UP: December orders for new foundry equipment were the largest in 14 months, the Foundry Equipment Manufacturers Association reports. Its index for the month was 137, against 83.3 in November, and 61.4 in December, 1957.

DEERE TO EXPAND: A $2.8 million expansion will be started this spring at the John Deere Malleable Works, East Moline, Ill. Capacity will be doubled in the program which calls for installation of facilities for production of nodular iron castings. The plant has been producing nodular iron for several months in temporary facilities there.

DIECASTING OUTLOOK: The upturn in diecasting demand which started last September resulted in the fourth quarter being the best of the year for jobbing shops, according to the American Die Casting Institute. Improvement has carried over into this year in all areas.

FORD LICENSED: Ford Motor Co., Detroit, has been licensed by the Ductile Iron Div., International Nickel Co., New York, to manufacture ductile iron castings. The Ductile Iron Division was organized by Inco recently, with Donald J. Reese as director.

NEW ALLOY: Details of its new high-silicon, low-carbon alloy, inoculated with boron and tellurium, were described by Central Foundry Div., General Motors Corp., at the recent Wisconsin Regional Foundry Conference. Called CentraSteel, its outstanding characteristic is its high modulus of elasticity — 28 million psi, against 30 million for steel. It contains about

Foundry Statistics

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1956	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Sept.	5,033,998	721,125	82,948	672,597
9 mo.	51,194,922	6,525,054	792,223	7,017,722
Oct.	5,333,767	817,338	91,766	718,791
Nov.	4,858,489	716,095	72,871	589,879
Dec.	4,281,414	661,918	70,091	542,008
Total	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Jan.	4,072,071	704,654	76,989	566,225
Feb.	3,491,441	611,394	64,971	466,657
Mar.	3,718,132	624,165	64,866	524,035
Apr.	3,429,121	599,427	61,839	631,220
May	3,862,491	596,253	59,060	553,756
June	4,409,006	615,271	62,703	605,733
July	3,716,739	543,726	47,203	513,394
Aug.	4,203,034	580,844	66,877	592,727
Sept.	4,472,219	680,660	71,198	637,400
9 mo.	35,374,254	5,556,394	575,706	4,991,147

Index of Foundry Equipment Orders

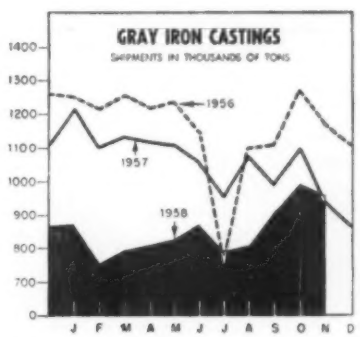
Foundry Trades Only

(Net Orders Closed, New Equipment)

	1957	1958
Jan.	117.9	57.9
Feb.	188.4	57.6
Mar.	127.0	85.9
Apr.	101.1	88.7
May	136.2	136.1
June	187.5	87.7
July	98.6	77.9
Aug.	231.3	74.1
Sept.	113.9	64.5
Oct.	145.3	118.9
Nov.	59.6	83.3
Dec.	61.4	137.0

Note: Base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.



GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings — Total	All Castings — For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Nodular Iron Castings Total	Heavy Steel Ingot Molds Total	Chilled Railroad Car Wheels Total	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders[2]
1956	13,860,527	7,960,391	8,265,526	3,647,991	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
Nov.	940,138	482,732	599,292	242,847	10,601	166,652	24,302	91,138	58,754	704,623
11 mo.	11,800,278	6,432,827	7,229,075	3,084,539	.....	2,261,216	336,159	1,277,845	695,983	.....
Dec.	864,226	443,670	557,154	226,356	9,810	148,074	23,173	73,500	62,325	675,838
Total	12,664,504	6,876,497	7,786,229	3,310,915	.....	2,409,290	359,332	1,351,345	758,308	.....
1958										
Jan.	868,255	436,398	580,545	229,014	10,806	135,110	23,511	78,863	50,226	638,069
Feb.	753,306	389,708	503,175	203,717	10,245	116,168	25,959	67,606	40,398	632,490
Mar.	795,568	446,822	499,751	215,916	9,485	125,887	24,777	87,716	57,437	589,912
Apr.	806,720	457,498	483,999	210,344	8,015	121,489	25,401	112,292	63,539	582,446
May	820,054	472,192	469,026	203,025	5,671	134,312	23,498	123,017	70,201	570,293
June	867,948	541,904	503,252	245,651	5,773	135,477	22,928	129,671	76,620	572,706
July	791,560	465,650	430,882	185,275	3,999	157,478	19,928	110,790	72,481	580,155
Aug.	802,473	513,862	410,876	205,821	4,211	165,006	18,537	129,157	78,897	614,199
Sept.	916,704	537,717	518,185	227,414	4,622	175,323	20,783	125,693	76,720	644,834
Oct.	992,730	586,614	551,380	253,062	4,193	207,500	22,970	129,375	81,505	619,667
Nov.	958,306	505,290	575,586	231,669	3,426	201,704	18,801	98,326	63,889	602,375
11 mo.	9,373,624	5,353,655	5,526,657	2,410,908	70,440	1,675,454	247,113	1,192,506	731,733	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. [1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

2.25 Si, 1.70 C, 0.40 Mn, 0.10 S, 0.05 P, and 0.01 B. No extensive heat treatment is required. The material is said to have the strength of steel but superior machinability.

T & R I BUILDING: Solicitation of bids for construction of a Foundry Training Center Building at Des Plaines, Ill., for the Training & Research Institute of the American Foundrymen's Society has been approved by the AFS board of directors, it was announced recently. The move follows recommendation by the T & R I trustees.

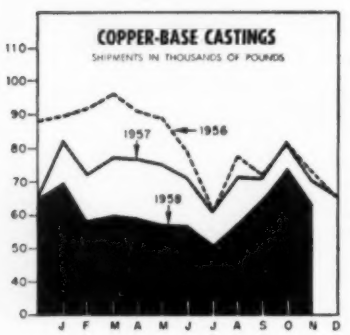
ALUMINUM RECORD: January production of 156,708 tons of primary aluminum was the highest on record, the Aluminum Association announces. It compares with 152,301 tons in December and 139,909 tons a year ago.

DUCTILE IRON SOCIETY: An organization committee of ductile iron castings producers met in Cleveland on Feb. 9 to further the establishment of the new Ductile Iron Society. By laws were drawn up for approval of the membership, which now includes 51 U. S. and Canadian foundries. Officers and directors are to be elected at a subsequent general meeting.

Robert S. Thompson, president, H. P. Deuscher Co., Hamilton, Ohio, is head of the organization committee, which also includes Armand Giorgio, Ductile Iron Foundry Inc.; William Beatty, Morris Bean & Co.; Neal Mingledorf, Savannah Foundry & Machine Co.; R. K. Guise, Kuhns Bros. Co.; Richard Westendorf, Dayton Castings Co.; B. G. Parker, Youngstown Foundry & Machine Co., and Chet Mally, Stuart Foundry Co. James H. Lansing, castings consultant, is consulting executive secretary of the society.

PERSONALS: G. J. Grott, formerly chief metallurgist, Michigan-Standard Alloy Castings Co., Detroit, has joined Wai Met Alloys Co., Detroit, as manufacturing manager . . . Albert W. Gruer Jr., manager of sales and marketing, Carondelet Foundry Co., St. Louis, has been elected secretary and a director . . . Mark M. Adkison, formerly melting superintendent, Jackson Industries, Production Foundries Div., Birmingham, has joined Alabama By-Products Corp., Birmingham, as foundry service engi-

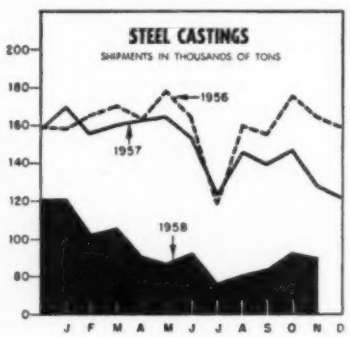
Foundry Statistics



COPPER-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mold	Unfilled Orders[2]
1956	966,306	866,545	57,522	.....
1957				
Nov.	70,187	63,944	3,006	34,249
11 mo.	809,672	729,713	41,700	.....
Dec.	65,708	59,606	3,046	31,509
Total	875,389	788,319	44,696	.....
1958				
Jan.	69,707	63,294	3,327	30,341
Feb.	58,356	52,579	3,202	27,243
Mar.	60,157	54,007	3,395	25,434
Apr.	59,311	53,271	3,385	25,621
May	57,506	51,634	3,077	22,867
June	57,124	51,967	3,001	21,578
July	51,124	46,636	2,351	20,518
Aug.	57,790	52,981	2,425	24,851
Sept.	64,447	58,435	2,888	25,655
Oct.	74,012	67,564	3,239	26,726
Nov.	62,746	57,386	2,604	24,928
11 mo.	672,250	609,754	32,894	.....



STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings			Carbon			Alloy			
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Unfilled Orders[2]
1956	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Nov.	127,115	98,436	26,892	93,343	71,846	25,105	33,772	26,590	1,787	362,948
11 mo.	1,645,404	1,267,622	325,656	1,240,377	952,622	303,173	405,027	315,000	22,513	.....
Dec.	120,787	92,125	23,403	88,101	66,468	21,808	32,686	25,657	1,595	327,337
Total	1,766,191	1,359,747	349,059	1,328,478	1,019,090	324,951	437,713	340,657	24,108	.....
1958										
Jan.	120,722	94,717	22,545	87,525	68,203	21,115	33,197	26,514	1,430	364,907
Feb.	103,297	79,708	16,647	74,283	56,781	15,273	29,014	22,927	1,374	282,358
Mar.	106,233	82,195	16,180	77,564	60,208	15,240	28,669	21,987	940	252,840
Apr.	91,464	69,121	11,956	65,639	48,998	11,107	25,825	20,123	849	229,563
May	87,002	66,086	10,416	61,105	45,967	9,463	25,897	20,119	953	211,346
June	92,861	71,624	14,185	67,227	50,919	12,987	25,634	20,705	1,198	190,779
July	68,802	48,618	5,400	46,858	32,161	4,656	21,944	16,457	744	200,272
Aug.	80,886	59,816	8,021	57,539	42,069	7,090	23,347	17,747	931	196,300
Sept.	85,277	64,586	9,205	60,392	44,890	7,905	24,885	19,696	1,300	196,482
Oct.	95,389	73,367	12,254	67,906	51,065	10,980	27,483	22,302	1,274	184,925
Nov.	85,267	65,788	9,648	59,793	45,808	8,501	25,474	19,980	1,147	193,960
11 mo.	1,107,200	775,626	136,457	725,831	547,069	124,317	291,469	228,527	9,140	.....

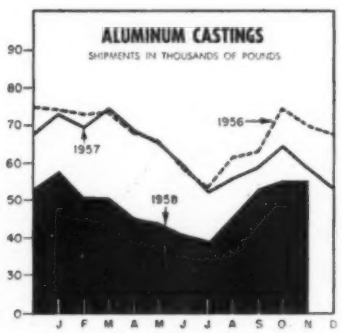
[1]Source: Bureau of Census. [2]For sale only.

neer . . . Earl Paltenghi, H. C. Macauley Foundry Co., Berkeley, Calif., has retired, for reasons of health, as a director of the Gray Iron Founders' Society. His unexpired term will be filled by Clayton Russell, Phoenix Iron Works, Oakland, Calif. . . . Henry W. Zimnawoda, since 1946 export manager and assistant sales manager, National Engineering Co., Chicago, has been appointed sales manager, National Engineering Co. of Canada . . . Stephen Pasick has been appointed sales and service engineer, Battle Creek Foundry Co., Battle Creek, Mich. He was formerly with Albion Malleable Iron Co., Sterling National Industries, and Brooks Foundry . . . William M. Ewing, general manager of the Sharon Works, National Malleable & Steel Castings Co., has been appointed vice president and general manager of National's Capitol Foundry Div., Phoenix, Ariz. He will be succeeded at Sharon by Lawrence G. Blackmon, recent general superintendent.

SDCE OFFICERS: New officers of the Society of Die Casting Engineers are Dean L. Rockwell, Clifford-Rockwell Co., president, and William Van Raaphorst, American Mold Engineering Co., vice president. New directors, for three-year terms, are John L. Weston, Grand Rapids Die Cast Co., and Ollie J. Clayton. Earl R. Mason has become the society's executive secretary. New address of the group is 19382 James Couzens Highway, Detroit, Mich.

OBITUARY: Howard J. Williams, director and retired sales manager, New Jersey Silica Sand Co., Millville, N. J., died Feb. 5 in Philadelphia . . . Leo A. Behrendt, 62, executive vice president, Joseph Dixon Crucible Co., Jersey City, N. J., died Feb. 11 . . . Albert Shepherd, former foundry superintendent, Hobart Mfg. Co., Troy, Ohio, died Feb. 4 in Granby, Mo., where he had lived since his retirement 15 years ago.

MISCELLANY: A. P. Green Fire Brick Co., Mexico, Mo., has acquired the Climax Fire Brick Co., Climax, Pa. . . . Carborundum Co. will build a $750,000 pilot plant for its Research and Development Division in Niagara Falls, N. Y. . . . Malleable Founders Society is moving to larger and more modern quarters at 781 Union Commerce Bldg., Cleveland 14.



PRODUCTION WORKERS

Estimated Number

	Nov. 1958	Oct. 1958	Nov. 1957
Ferrous	172,900	158,500	192,300
Nonferrous	50,700	47,600	54,900

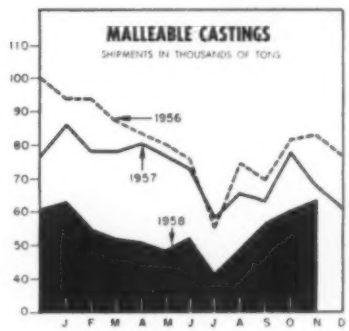
Average Weekly Earnings

Gray Iron	$89.15	$85.88	$83.18
Malleable Iron	91.03	85.33	85.57
Steel	94.60	94.35	91.63
Nonferrous	96.63	94.87	90.94

Average Weekly Hours

Gray Iron	38.1	38.0	37.3
Malleable Iron	38.9	37.1	38.2
Steel	38.3	38.2	38.5
Nonferrous	40.6	40.2	39.2

Source: Bureau of Labor Statistics.



ALUMINUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1956	794,581	171,181	245,421	376,230	.....
1957					
Nov.	58,898	10,411	18,611	29,793	91,860
11 mo.	698,557	134,849	215,602	351,908	.....
Dec.	53,102	9,302	16,724	26,978	86,323
Total	751,656	144,151	232,326	369,086	.....
1958					
Jan.	57,845	10,724	18,082	28,937	77,067
Feb.	50,695	9,601	15,456	25,279	75,647
Mar.	50,547	9,311	15,255	25,918	63,600
Apr.	44,948	9,531	13,369	21,956	60,317
May	44,093	9,312	13,648	21,091	59,666
June	40,701	8,644	13,679	18,292	63,670
July	38,818	8,658	12,342	17,714	68,618
Aug.	45,034	9,034	14,426	21,505	71,135
Sept.	52,796	10,261	16,241	26,254	72,819
Oct.	55,699	10,932	17,189	27,511	73,474
Nov.	55,793	10,539	16,942	28,264	76,370
11 mo.	536,969	106,547	176,629	262,721	.....

[1]Source: Bureau of the Census. [2]For sale only.

MALLEABLE IRON CASTINGS

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1956	951,868	557,636	812,905	479,563	138,963	78,073	.....
1957							
Nov.	67,904	38,085	55,564	31,036	12,340	7,049	80,074
11 mo.	802,551	485,775	664,845	404,444	137,706	81,331	.....
Dec.	60,425	34,343	48,694	27,218	11,731	7,125	74,863
Total	862,976	520,118	713,539	431,662	149,437	88,456	.....
1958							
Jan.	62,734	34,920	51,440	28,516	11,294	6,404	67,292
Feb.	54,650	31,006	45,419	25,381	9,231	5,625	59,047
Mar.	51,708	29,624	43,368	24,333	8,340	5,291	54,330
Apr.	50,695	29,388	41,794	23,605	8,901	5,783	47,664
May	48,306	26,656	40,092	21,710	8,214	4,946	46,603
June	51,882	31,077	42,910	25,679	8,972	5,398	48,260
July	41,865	24,479	33,857	20,023	8,008	4,456	58,340
Aug.	49,252	29,414	41,734	24,696	7,518	4,718	55,145
Sept.	56,836	31,999	45,945	26,370	10,891	5,629	58,405
Oct.	60,981	40,014	50,181	31,992	10,800	8,022	63,425
Nov.	63,356	35,221	50,063	28,409	13,293	6,812	66,725
11 mo.	592,255	342,798	486,863	280,714	105,462	63,084	.....

Prices of Foundry Metals and Coke

(As of Feb. 23, 1959)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$18.00-18.50

OVEN

Birmingham	$30.35
Buffalo	32.00
Detroit	32.00
Erie, Pa.	32.00
Indianapolis	31.25
Kearny, N. J.	31.25
Milwaukee	32.00
Neville Island (Pittsburgh)	30.75
New England, deld.	33.55
New Haven, Conn.	31.00
Painesville, O.	32.00
Philadelphia	31.00
St. Louis	33.00
St. Paul	31.25
Swedeland, Pa.	31.00
Terre Haute, Ind.	31.25

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$65.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	65.50	69.00
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	65.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 29.00; tin bronze, No. 225, 40.00; No. 245, 33.00; High-leaded tin bronze, No. 305, 33.25; No. 1 yellow, No. 405, 24.00; manganese bronze, No. 421, 25.75.

ALUMINUM: 99 per cent plus primary ingots 26.80. Secondary No. 12 alloy, 21.75-22.00. Deoxidizing grades: No. 1, 23.50; No. 4, 19.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 30.00, delivered Connecticut valley.

ZINC: High grade 12.50, delivered. Die casting alloy No. 3, 14.00; No. 2, 14.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$33.00-34.00	$53.00-54.00	.....	.....	.....	.....	$51.00-52.00
Boston*	**31.00-31.50	**33.00	.....	.....	**34.00	.....	.....
Buffalo	41.00-42.00	**46.00-47.00	.....	.....	**50.00-51.00	.....	57.00-58.00
Chicago	45.00-46.00	49.00-50.00	.....	57.00-58.00	57.00-58.00	59.00-60.00	61.00-63.00
Cincinnati*	**39.50-40.50	**45.00-46.00	**40.00-41.00	.....	**49.00-50.00	.....	**57.00-58.00
Cleveland	44.00-45.00	50.00-51.00	41.00-42.00	50.00-51.00	53.00-54.00	66.00-67.00	60.00-62.00
Detroit*	**38.00-39.00	**44.00-45.00	**35.00-36.00	**47.00-48.00	.....	.....	.....
Los Angeles	36.00	**47.00	.....	.....	.....	.....	.....
New York*	30.00-31.00	35.00-36.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	40.00	39.00-43.00	43.00	.....	49.00-50.00	68.00	.....
Pittsburgh	43.00-44.00	45.00-46.00	.....	39.00-40.00	52.00-53.00	.....	59.00-61.00
St. Louis*	37.00	50.00	.....	.....	.....	.....	53.00
San Francisco	32.00-34.00	44.00	28.00	40.00	40.00	.....	.....
Seattle	31.00	31.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Foundry Statistics

ZINC-BASE CASTINGS

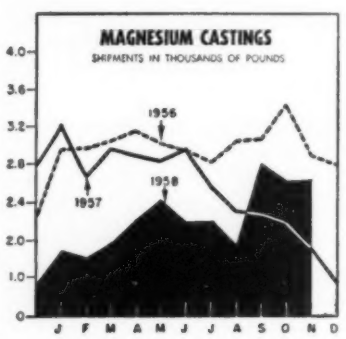
(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1956	693,728	449,516	.....
1957			
Nov.	58,689	35,005	63,665
11 mo.	614,003	395,326	.....
Dec.	49,597	29,998	58,792
Total	663,600	425,334	.....
1958			
Jan.	50,568	30,368	55,883
Feb.	42,687	27,482	50,676
Mar.	39,719	26,782	43,366
Apr.	35,796	23,830	27,634
May	36,447	24,588	33,438
June	38,132	25,993	34,888
July	32,765	22,843	41,534
Aug.	35,860	26,971	45,066
Sept.	47,127	33,520	50,762
Oct.	45,045	36,103	58,154
Nov.	48,431	34,054	57,864
11 mo.	452,577	312,534	.....

MAGNESIUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1956	36,158	33,580	.....
1957			
Nov.	1,920	1,806	4,802
11 mo.	28,789	27,044	.....
Dec.	1,533	1,408	4,823
Total	30,322	28,452	.....
1958			
Jan.	1,881	1,756	5,227
Feb.	1,803	1,730	5,589
Mar.	1,975	1,860	5,555
Apr.	2,215	2,141	5,555
May	2,422	2,196	5,200
June	2,205	1,996	5,515
July	2,200	2,063	6,706
Aug.	1,869	1,808	6,086
Sept.	2,804	2,581	6,083
Oct.	2,627	2,479	5,463
Nov.	2,615	2,523	4,063
11 mo.	24,616	23,133	.....



PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Net Tons: Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Gross Tons: Total	Cupola	Air	Electric
1956	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	66,967,618	4,786,011	261,377	211,193
1957									
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	5,073,898	309,674	14,886	17,199
11 mo.	73,344,087	2,110,521	3,468,438	60,736,515	7,028,613	.....	.....	.....	.....
Dec.	5,212,624	165,268	228,897	4,394,869	423,590	4,565,635	288,219	14,754	13,881
Total[3]	78,557,011	2,275,789	3,697,335	65,131,684	7,452,203	67,902,434	4,160,891	218,178	246,851
1958									
Jan.	4,785,269	100,097	232,802	4,036,451	415,859	4,208,692	306,794	16,102	14,426
Feb.	4,016,276	106,921	193,429	3,396,382	319,094	3,551,679	260,940	14,014	7,740
Mar.	4,418,778	156,386	227,785	3,645,353	389,254	3,824,140	270,214	13,472	8,753
Apr.	3,787,907	136,180	173,139	3,053,634	424,954	3,378,893	262,007	13,975	9,585
May	4,048,328	127,438	165,045	3,359,836	396,009	3,691,550	256,204	12,001	11,764
June	4,396,285	121,869	167,192	3,764,607	342,617	4,058,714	262,883	12,098	15,549
July	4,277,515	123,075	156,582	3,595,008	402,850	3,820,293	239,140	10,550	12,140
Aug.	4,768,581	141,185	145,216	4,085,669	396,511	4,324,052	247,428	13,196	32,309
Sept.	5,040,597	133,566	234,752	4,256,253	416,026	4,524,851	300,173	14,994	27,759
Oct.	5,835,995	146,386	257,111	4,856,692	575,806	.....	.....	.....	.....
Nov.	5,906,888	175,210	257,131	4,985,452	489,095	.....	.....	.....	.....
11 mo.	51,273,259	1,468,313	2,176,542	43,102,849	4,525,555	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

BLANEY, SOUTH CAROLINA
Washed Silica Sands

	55 B (50 — 60)	65 B (60 — 70)	80 B (70 — 95)	140 B (130 — Plus)	120 B (110— 135)
30	3.6	.4			
40	14.0	3.8	1.0		.5
50	27.7	15.6	6.6	.2	3.4
70	28.7	29.4	21.0	1.4	11.2
100	18.1	28.6	32.8	8.0	20.4
140	6.8	16.2	27.0	24.6	25.8
200	1.0	4.2	8.4	28.4	18.2
270	.1	1.4	2.4	21.8	12.1
Pan		.4	.8	15.6	8.2
AFS	51	68	82	161	121

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
75 Westminster St., Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DUO RESIN
Binder for baking with controlled oven temperatures

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

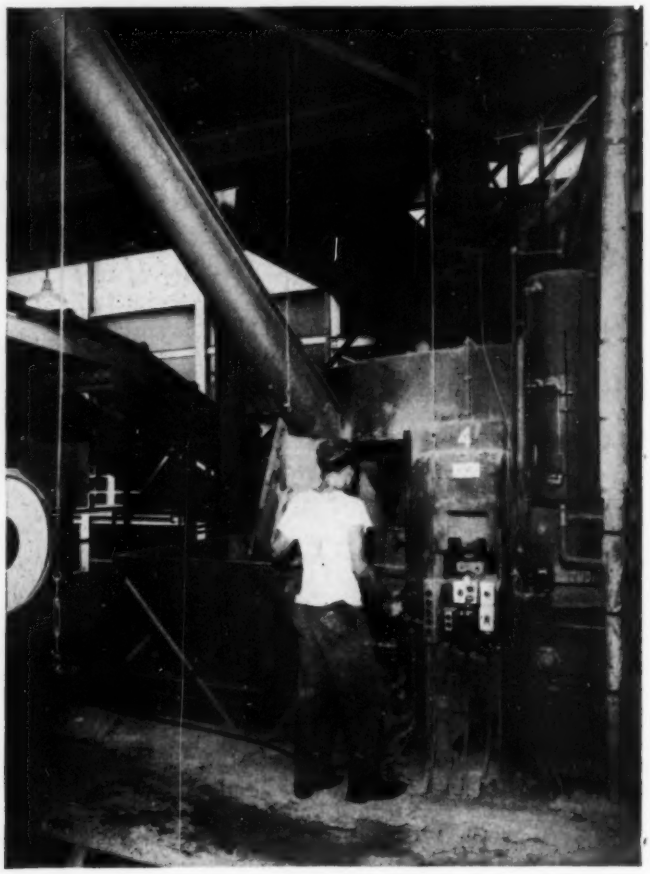
Circle 580 on Page 53

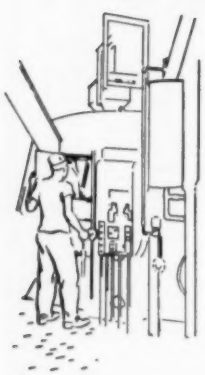
Prepare your sand *AUTOMATICALLY*

with a

Clearfield

mixer





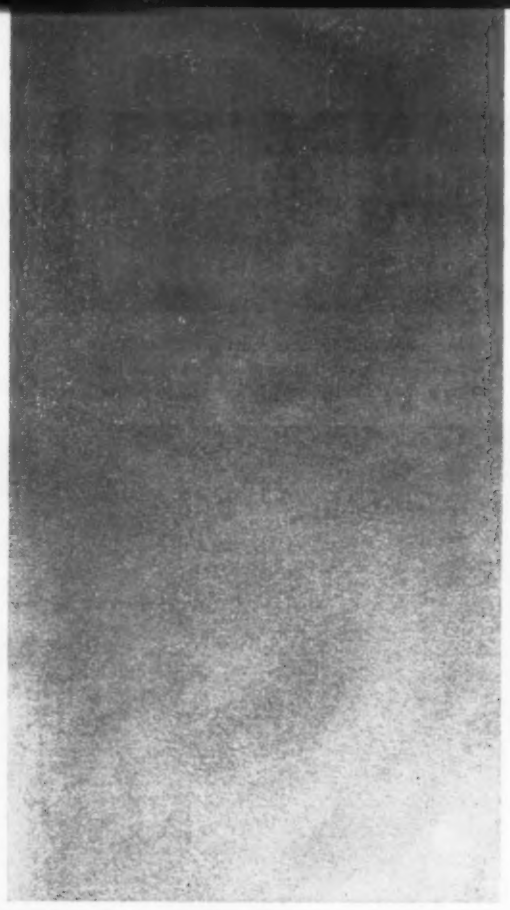
Fast thorough
sand preparation

Complete uniformity in sand preparation is assured by using a Clearfield Mixer with Automatic controls. The operation of any Clearfield Mixer may be made partly or completely automatic by the use of electric time control apparatus. Length of tempering period, quantity of bond and moisture additions are predetermined, substituting individual judgment. The controls may be easily changed to produce any type of sand desired.

Write for Catalog No. 90. Gives full details on the Clearfield Mixer for your need.

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A

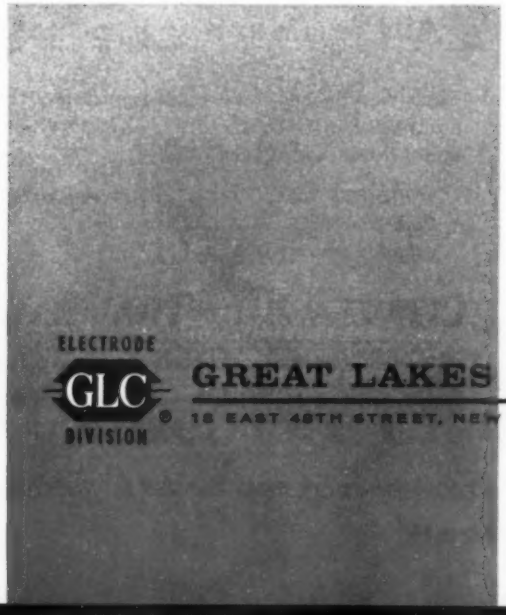
Circle 581 on Page 53



IN THE FINAL ANALYSIS

• • • the superior quality of an electrode is a major factor in lowering the per-ton cost of electric steels.

PRODUCTS YOU CAN TRUST
ELECTRODE GLC DIVISION



ELECTRODE GLC DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N. Y. OFFICES IN PRINCIPAL CITIES

Circle 582 on Page 53

EFFICIENT HANDLING at Landis Tool Company Since 1942

Pouring is expedited because large ladles of metal can be delivered directly from cupolas to molds on the overhead Tramrail. This speeds the operation and reduces metal heat loss. The Tramrail equipment is hand-propelled of one ton capacity with manual and power-driven hoists.

CLEVELAND TRAMRAIL a *Big Aid* in Foundry Production

EXCEPT for one bay devoted to very heavy castings, the entire modern foundry of Landis Tool Company, Waynesboro, Pa., is covered by a Cleveland Tramrail crane and track system. This has been a big factor in making the handling of the various foundry materials easier, faster and more efficient. It has played an important role in obtaining greatly reduced costs and improving safety.

Having been in continuous operation since 1942, the design and quality of the Tramrail equipment have been fully proven to Landis. Their foundry Superintendent reports that the equipment has been very satisfactory and maintenance extremely low.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. 3843 East 286 St., WICKLIFFE, OHIO

Circle 583 on Page 53

Mail this coupon today to find out how

The Denver Fire Clay Co.
3033 Blake Street
Denver, Colorado
Please send full information on the DFC line of industrial furnaces.

Name .....
Address .....
City .....

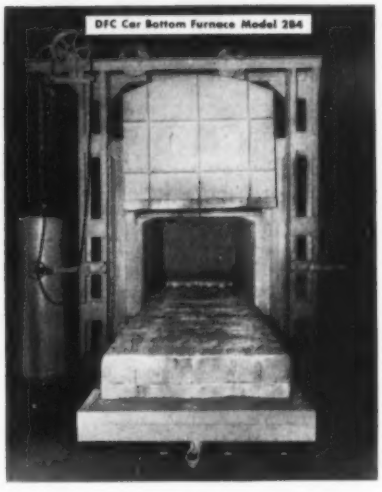
Denver Fire Clay builds Better Furnaces for Industry

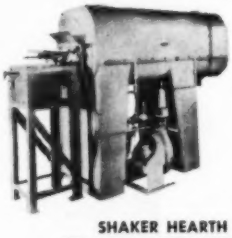
Special Car Bottom, Heat Treating Furnaces

The Denver Fire Clay Company designs and supervises the construction of special car bottom, heat treating furnaces to your requirements.

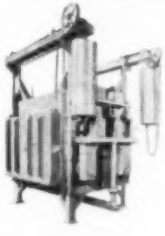
The efficient design of each furnace is assured by many years of experience in the manufacture of industrial furnaces. Constructions for heat treating carbon steel, manganese steel and malleable iron castings; also for stress relieving welded steel assemblies and forgings.

Prerequisites of every DFC Furnace design are **Simplicity, Durability** and **Efficiency.** Let our engineering staff help with your heat treating problem.





SHAKER HEARTH
HEAT TREATING FURNACE



BOX TYPE
HEAT TREATING FURNACE

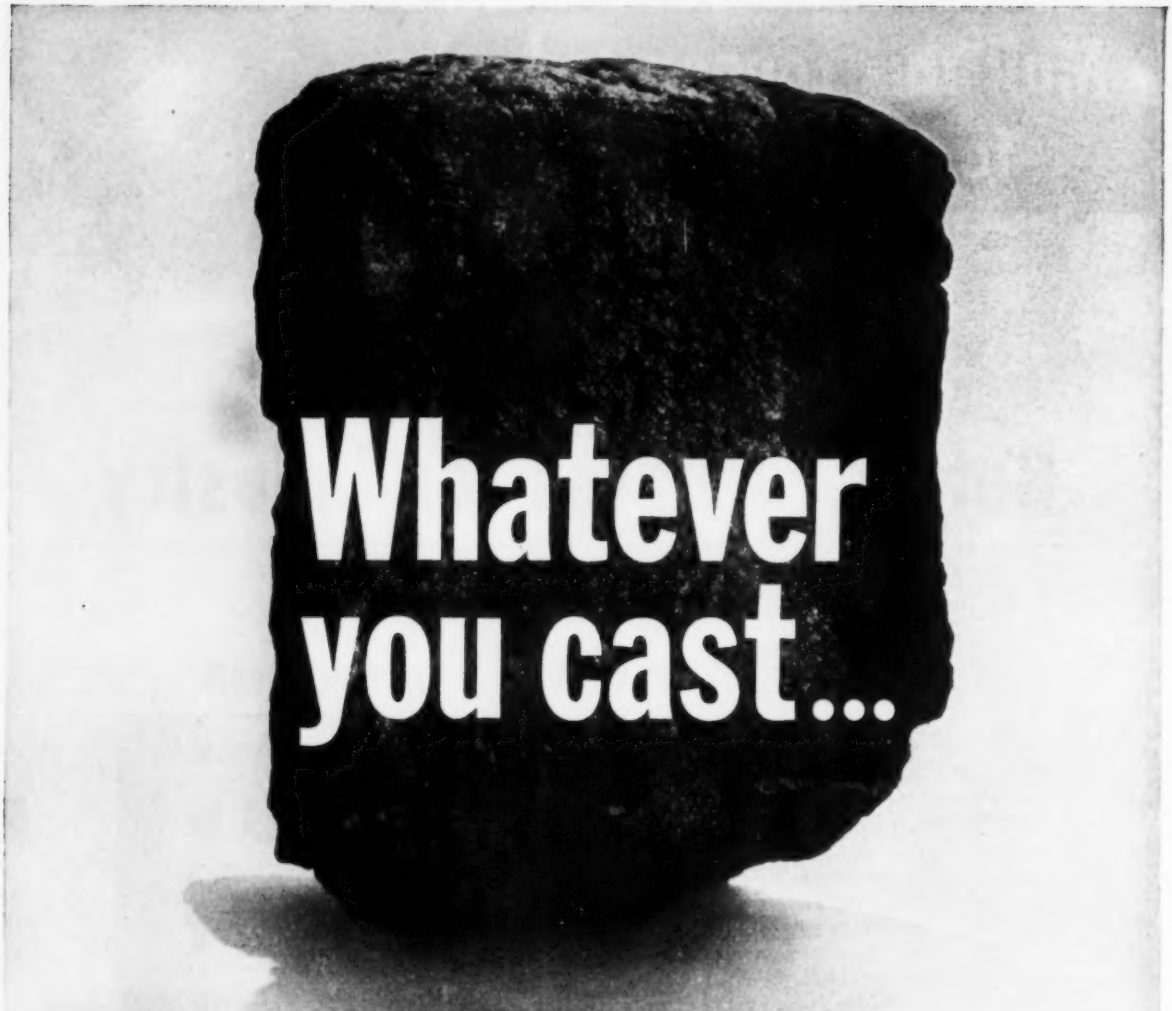
SEMI-MUFFLE TYPE
HEAT TREATING FURNACE

Denver Fire Clay Company

DENVER • SALT LAKE CITY • EL PASO

DF 9-7

Circle 584 on Page 53



Whatever you cast...

Comes out better with

KOPPERS *Premium Foundry Coke*

You'll have fewer rejects—far better quality castings when you switch to Koppers Premium Foundry Coke. Car after car, Koppers delivers a superior coke that's absolutely *uniform* in *size, strength, structure* and *chemical analysis.* Because of the higher carbon content in Koppers Premium Foundry Coke, the foundryman can maintain a higher temperature range which increases the cleanliness of the iron. This in turn, helps reduce fuel consumption—means lower operating costs all around. Next time order Koppers Premium Foundry Coke. Available anywhere in the U.S. or Canada in sizes to meet your needs. Koppers Company, Inc., Pittsburgh, Pa.

WE CHECK EACH DAY'S RUN to make certain you get foundry coke of the exact size and chemistry that is most efficient for the job. Analyses are available to your foundry on request.

Speedy Sling Service with Engineered Safety

NEW... KUPLEX

Sling Chain Assemblies with Foundry Hooks

Made Especially for Trunnions and Other Foundry Uses

• Chain sling assemblies that are "tailor-made" to your own foundry requirements are now as near to you as your telephone! This remarkable development in really fast sling service is made possible by American Chain's great new ACCOLOY Kuplex sling chains with new Kuplex foundry hooks.

For the first time, your nearby Kuplex distributor can now furnish you with Kuplex sling chain assemblies made with drop-forged steel foundry hooks in six sizes: ¼" to ⅞". Vastly superior to homemade hooks in design and safety, Kuplex foundry hooks are engineered to be as strong as the chain itself—as are all the components which go into a Kuplex sling chain assembly. Kuplex foundry hooks are forged into a round at the point for easy insertion in casting holes.

Find out about the many advantages of ACCOLOY Kuplex Sling Chains from your authorized Kuplex distributor. Assembled locally of matched and engineered components, each part in a Kuplex sling assembly is designed and engineered specifically for use with all other parts. Each part is made from heat-treated ACCOLOY steel and proof-tested at twice working-load limits. Your nearby distributor is equipped to furnish without delay new body chain for replacement in worn or damaged slings.

Kuplex Sling Chains made of ACCOLOY 125 chain are available in six sizes (¼" through ⅞") in single, 2-leg, 3-leg or 4-leg styles.

• ACCO FOUNDRY HOOKS CAN ALSO BE FURNISHED ON ACCO Registered SLING CHAINS

Write our York, Pa., office for the name of the Authorized Kuplex Sling Chain Distributor nearest to you

American Chain Division

AMERICAN CHAIN & CABLE

Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

**Indicates Warehouse Stocks*

ACCO

TRADE MARK

Circle 586 on Page 53

WEDRON

A COMPLETE LINE OF 24 DIFFERENT PROCESSED SILICA SANDS

A CONTROLLED GRADE FOR EVERY CASTING NEED!

SAND SPECIFICATIONS — REPRESENTATIVE SCREEN ANALYSES

Unground Sand	4098	4085	4060	4040	4030	4020	5040	5030	5025
Ret on 20 Mesh	2.2								
Thru 20 ret on 30	38.6	12.4	5.6	0.6	0.4	0.4			
Thru 30 ret on 40	57.6	70.8	56.2	37.2	30.2	21.2	4.0	1.2	0.6
Thru 40 ret on 50	1.4	16.3	34.8	52.0	55.8	51.4	34.8	30.4	23.8
Thru 50 ret on 70	0.2	0.5	2.8	9.0	11.4	20.6	44.4	48.2	42.0
Thru 70 ret on 100			0.6	1.0	1.8	5.2	14.4	17.8	26.4
Thru 100 ret on 140				0.2	0.4	1.0	2.0	2.0	6.2
Thru 140 ret on 200						0.2	0.4	0.4	0.8
Thru 200 ret on 270									0.2
Grain Fineness (AFS)	25.88	30.49	33.72	37.48	38.82	42.22	49.96	51.64	56.90

Unground Sand	5015	5010	5005	7030	7020	7010	C-30	C-10
Ret on 20 Mesh								
Thru 20 ret on 30								
Thru 30 ret on 40	1.2	0.4	0.2	0.2	0.2			
Thru 40 ret on 50	15.2	11.2	4.4	3.0	2.4	0.4		
Thru 50 ret on 70	40.2	35.2	31.2	26.2	18.0	8.2	0.4	0.2
Thru 70 ret on 100	35.4	37.4	41.2	42.0	45.0	46.6	28.4	8.4
Thru 100 ret on 140	6.4	10.8	15.4	16.4	20.0	23.2	44.8	50.2
Thru 140 ret on 200	1.2	4.0	5.6	9.6	11.0	15.4	18.8	28.2
Thru 200 ret on 270	0.4	0.8	1.4	1.8	2.4	4.2	5.0	8.8
Thru 270 ret on 325		0.2	0.6	0.8	1.0	2.0	2.6	4.2
Grain Fineness (AFS)	60.20	66.92	73.92	79.36	84.42	95.44	108.22	124.60

Ground Sand (Flour)	80M	100M	140M	200M	300M	325M	400M
Ret on 60 Mesh	10/20%						
Thru 60 ret on 100	25/30%	5%					
Thru 100 ret on 140	15/20%	14%	4%	1%			
Thru 140 ret on 200	10/15%	16%	6%	4%	2%	Trace	
Thru 200 mesh	25/40%						
Thru 200 ret on 270		10%	12%	6%	2%	0.5%	Trace
Thru 270 ret on 325		12%	8%	9%	11%	4.5%	2%
Thru 325 mesh		43%	70%	80%	85%	95.0%	98%

99.9% PURE SILICA WEDRON SILICA COMPANY INDUSTRIAL SAND

FINE SHELL MOLDING SANDS
STANDARD CASTING SANDS — BLASTING SANDS
SILICA FLOUR — LIGHT METAL CASTING GRADES

Wedron offers you a complete line up of casting sands — anything needed for every *casting* need! This means you get the advantages of one source of supply for all the sand you need — sand of the highest quality, too.

Now this Wedron quality stems from two factors. First is the naturally rounded grain sand of the Ottawa-Wedron district (this is held to be one of the purest silica sand deposits in the nation). Second is the modern, completely equipped Wedron plant, which turns out a superior silica product and makes all grades available.

Look to Wedron for the *complete* line of quality casting sands.

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

135 SOUTH LASALLE STREET, CHICAGO 3, ILLINOIS

POSITIVE DUPLICATION – EVERY TIME!

Each of these gyroscopes positively duplicates the built-in balancing action of every other gyroscope.

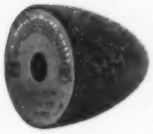
And *balance built-in* is an important advantage you get with the snagging wheels shown above, and with *all* CINCINNATI (PD)° WHEELS. They are manufactured by a remarkable process that gives Positive Duplication, time after time after time.

SMOOTHER, SAFER OPERATION

With every step of manufacturing rigidly controlled, this unique (PD) process produces wheels of unsurpassed uniformity. One important result: balanced action for a safer job . . . a better job.

LOWER YOUR COSTS

Your cleaning room costs will go down, with the help of a CINCINNATI grinding specialist.



Let him work with you in finding the best grading for your stand, swing frame and portable grinders. Then you can *keep* those costs down, because each reorder CINCINNATI (PD) WHEEL will act and grind exactly like the original wheel . . . thanks to Positive Duplication.

CALL CINCINNATI

For experienced help on cutting costs, call your CINCINNATI (PD) GRINDING WHEELS distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

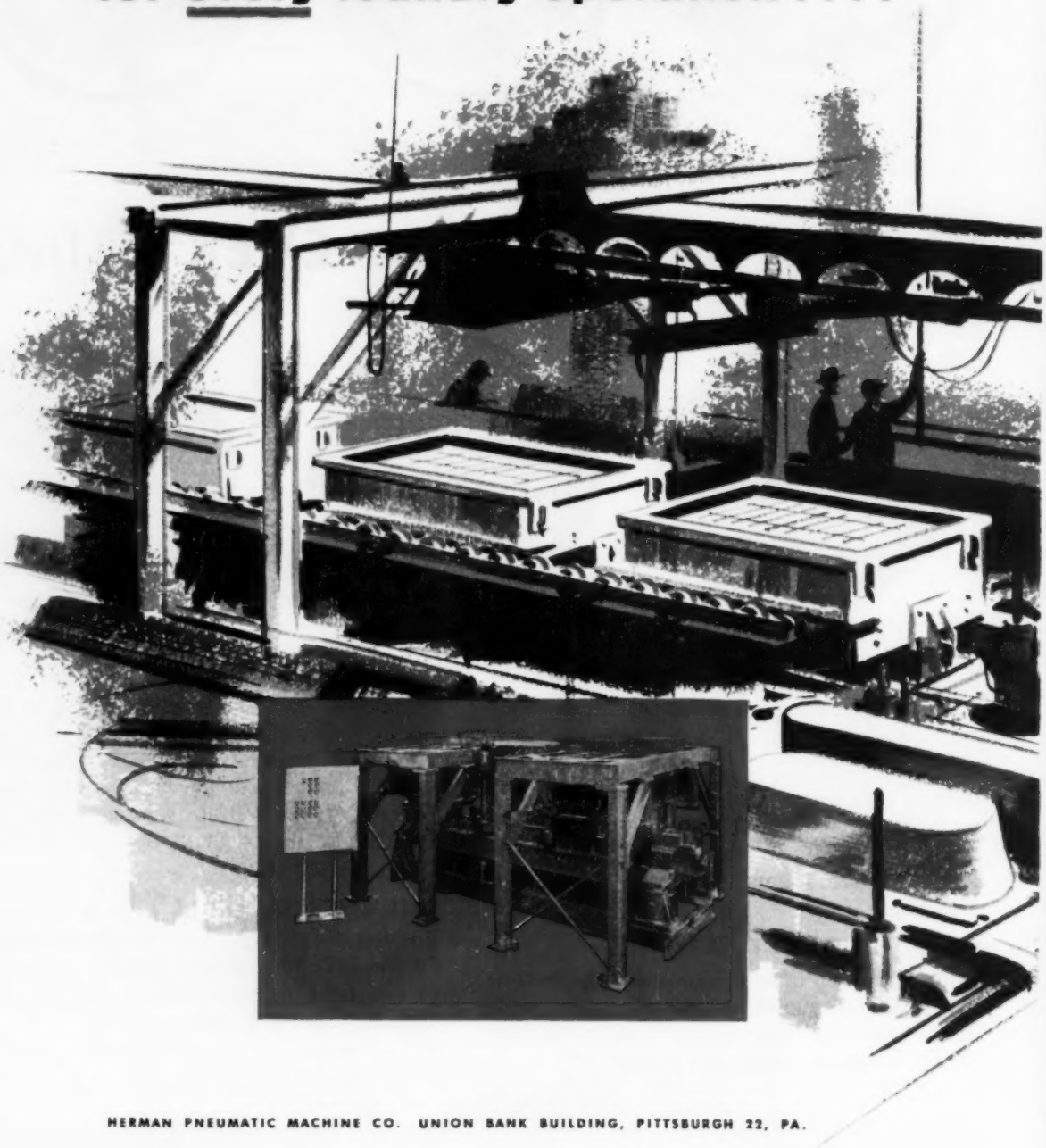
(PD) POSITIVE DUPLICATION

CINCINNATI° GRINDING WHEELS

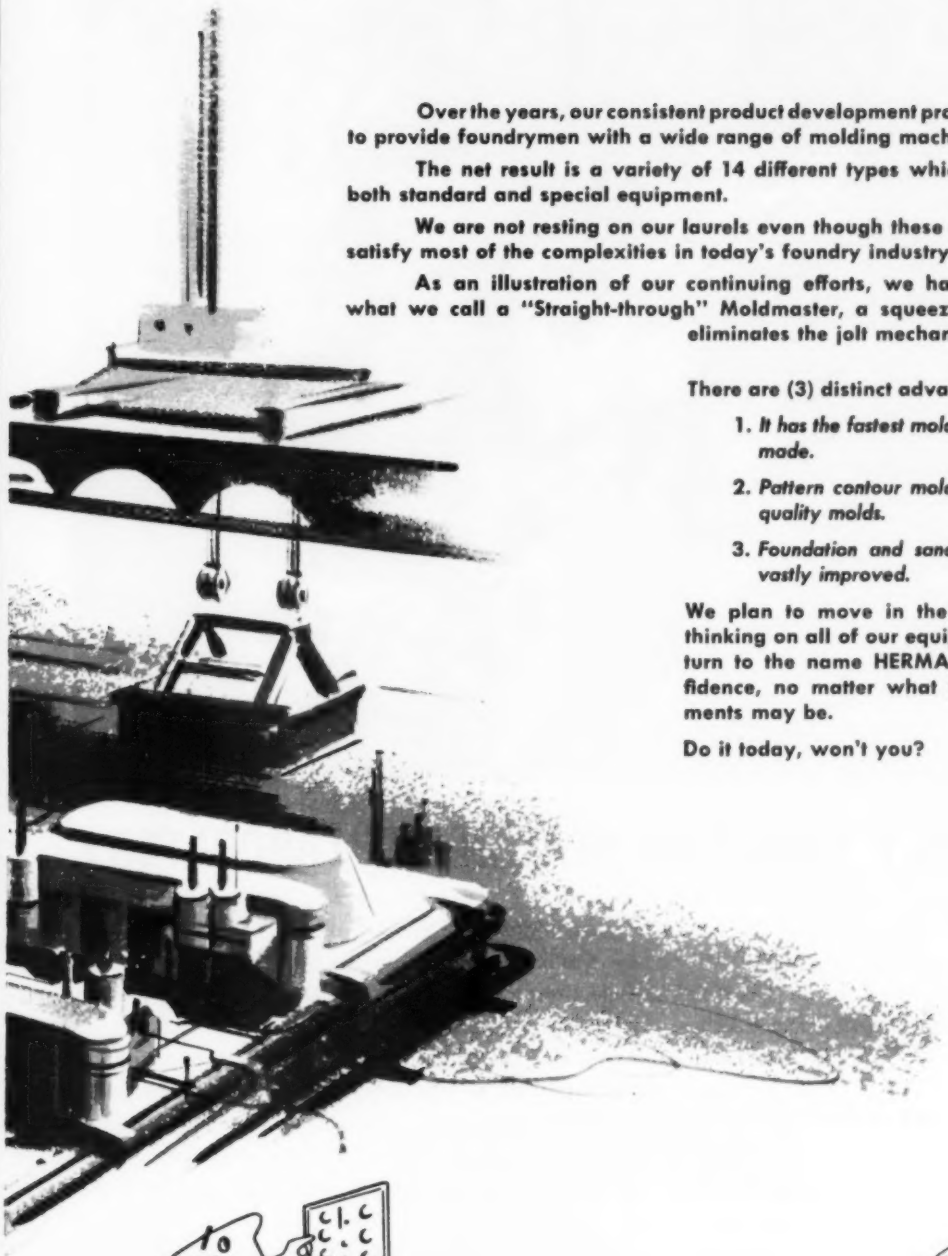
A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

a type and size molding machine for every foundry operation . . . .



HERMAN PNEUMATIC MACHINE CO. UNION BANK BUILDING, PITTSBURGH 22, PA.



Over the years, our consistent product development program has been planned to provide foundrymen with a wide range of molding machines.

The net result is a variety of 14 different types which fill today's need for both standard and special equipment.

We are not resting on our laurels even though these different types seem to satisfy most of the complexities in today's foundry industry.

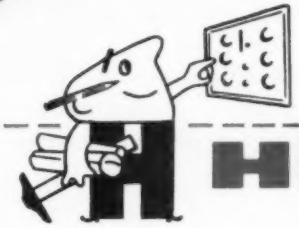
As an illustration of our continuing efforts, we have recently developed what we call a "Straight-through" Moldmaster, a squeeze-strip machine which eliminates the jolt mechanism.

There are (3) distinct advantages to this machine:

1. ***It has the fastest molding cycle of any machine made.***
2. ***Pattern contour mold compacting assures top quality molds.***
3. ***Foundation and sand spillage conditions are vastly improved.***

We plan to move in the direction of forward-thinking on all of our equipment, so that you can turn to the name HERMAN with complete confidence, no matter what your molding requirements may be.

Do it today, won't you?

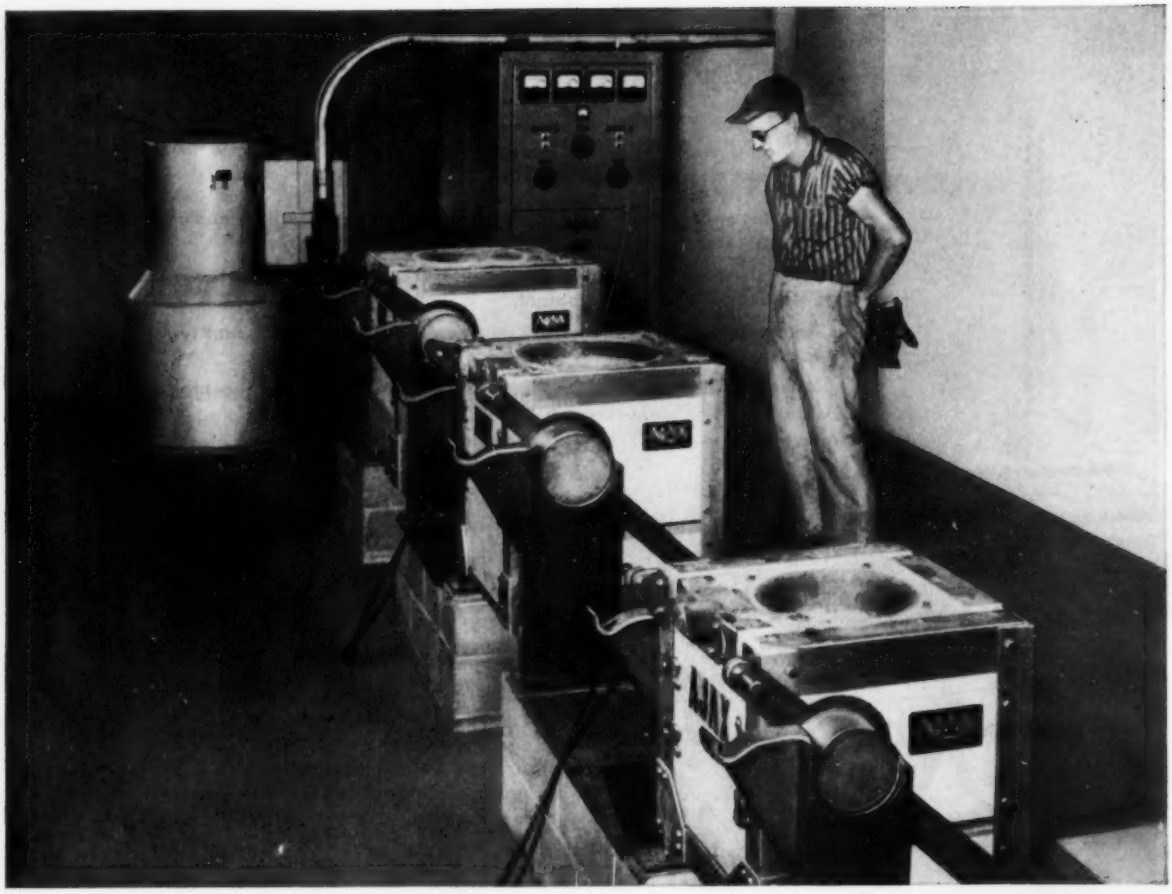


HERMAN

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

and most progressive

Best Known Name in Engineered Molding Machines



HIGH FREQUENCY INDUCTION HEAT IN THE LABORATORY

For the laboratory metallurgist, the moment of truth is in the melting furnace. More likely than not, the crucible he turns to is set in the helix of an Ajax-Northrup induction coil. For ever since its discovery, high frequency induction heat has been instrumental in the birth of new metals.

The *clean* heat of the induction furnace has ushered in alloys unmarred by impurities . . . has permitted the successful development of vacuum metallurgy. Its precise control of heat permits alloying as the metallurgist desires —no longer at the mercy of chance. And the stirring action inherent in Ajax-Northrup induction melting has actually made possible many new metals and alloys.

There you have just a few of the advantages that make Ajax-Northrup furnaces a laboratory standby. Even in this day of computers, spectrographs, and electron microscopes, they are assured an important place in the search for the unknown . . . the study of the known.

Induction heating & melting

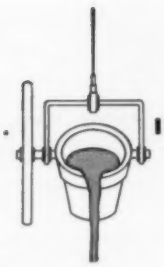
AJAX

NORTHRUP

Available in capacities from a few pounds to several thousand pounds, Ajax-Northrup furnaces may be powered by economical converters or heavy duty motor generator sets. Write for Catalog.
Ajax Electrothermic Corp., Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION

TEAMWORK . . . IN FOUNDRY SCIENCE AND CHEMICAL RESEARCH



DELTA FOUNDRY PRODUCTS

for faster production of FINER FINISH CASTINGS at lower cost

For more than a quarter of a century Delta Oil Products Corp. has pioneered in the development of plastic-type core and mold washes and has continued to lead in the introduction of new and improved products for the production of better castings — faster and more economically.

CORE AND MOLD WASHES:

FOR GRAY IRON, MALLEABLE & NON-FERROUS:

PLASTIC TYPE	POWDER TYPE
*Regular Base	DriKoat F
*Special Base	DriKoat B-3
*Z-Special Base	DriKoat B-5
*BlacKoat C-2	DriKoat B-10
*BlacKoat C-4	DriKoat B-15
*BlacKoat S-5	DriKoat Z
*GraKoat	DriKoat ZZ
*PyroKoat-G	PyroKoat
*PyroKoat-S RedKoat	LIQUID TYPE
*ShellKoat FM	*SuperKoat
*SteelKoat	
*SuperKoat	
*ThermoKoat	
*Z-Koat	
*ZZ-Koat	

FOR STEEL:

PLASTIC TYPE	POWDER TYPE
*Regular Base	DriKoat Z
*Special Base	DriKoat ZZ
*Z-Special Base	PyroKoat
*PyroKoat-S RedKoat	LIQUID TYPE
*ShellKoat FM	*SuperKoat
*SteelKoat	
*SuperKoat	
*ThermoKoat	
*Z-Koat	
*ZZ-Koat	

FOR GRAY IRON ONLY: PLASTIC TYPE	FOR NON-FERROUS ONLY: PLASTIC TYPE
*ChillKoat	*GraKoat A-1
	*NonferrusKoat

A FOUNDRY FIRST . . . BY DELTA

PARTINGS:

LIQUID TYPE	POWDER TYPE	CONCENTRATE—LIQUID
*Graph-Plate	*Partex	
Part-Rite	*Super Partex	
Regular		

SPECIFICATION CORE OILS:

with required tensile strength, baking, or drying time, rate of collapsibility, etc.

CORE RESINS:	CORE BINDERS:
*LIQUID TYPE—FAST-DRI	LIQUID TYPE—ROSIN CONTENT
	DRY POWDER TYPE
	Dri-Bond
	*Bondite

SILICATE—COLD PROCESS BINDERS:

LIQUID TYPE	DUAL SET—LIQUID
	Mona-Set
	L. V.

SPRAY BINDERS—MOLD:

CONCENTRATE	LIQUID TYPES

MUDDING & PATCHING COMPOUNDS:

PLASTIC TYPE
*Ebony
*Sliktite

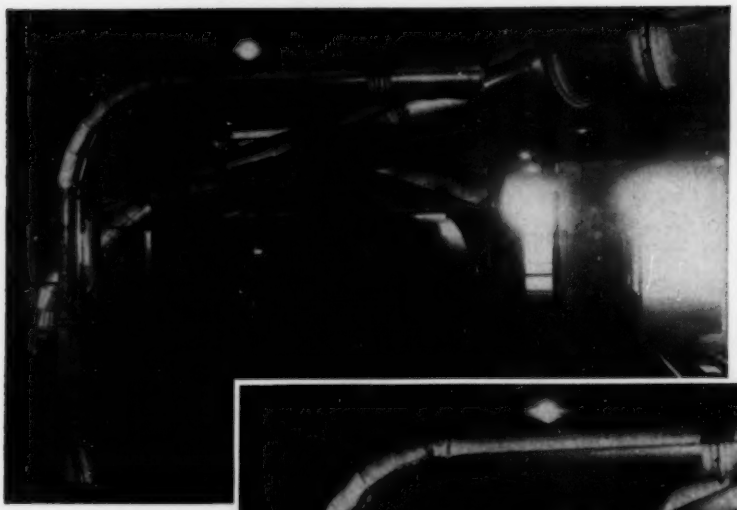
SPECIALTY PRODUCTS:

298XXA CO_2 Release Agent
*436-B Chill Oil
Core Rod Dip Oil
*Sand Conditioning Oil
*96B Sand Release Agent
275B High Temperature Lubricant
Mold Seal Compounds
286XX Sealer Compound
Liquid Griptite
200-3X Core Adhesive
Griptite Core Paste
*No-Vein Compound
*Permi-Bond
250XX Ingot MoldKoat
Hi Temperature Ingot MoldKoat
Thermofiller

DELTA . . GOOD TO THE CORE!

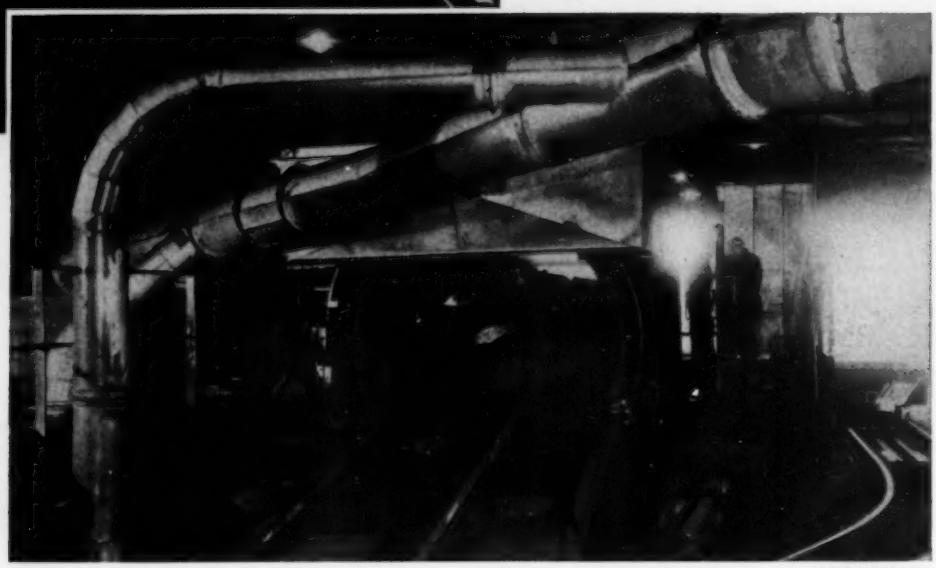
Get the facts . . . Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CORP.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS
MILWAUKEE 9, WISCONSIN



BEFORE: Inside the dump house before turning on the Joy Microdyne. Unretouched photo shows how dust laden air creates a choking haze.

AFTER: This unretouched photo shows dump house after the collector has been in operation for 15 minutes. The air has cleared, and dusts are carried through ducting to the Joy Microdyne.



WSW I 7431-284

JOY MICRODYNE DUST COLLECTOR GIVES CLEAN AIR... EVEN IN COAL DUMP

A large coal mine had a serious dust problem. Coal dust from a rotary car dump would fill the air in the building in which the equipment was housed. Over a period of two shifts, so much dust would settle that the conveyor equipment under the dump would clog with dust. A maintenance man would spend most of the third shift with shovel and broom to clear the accumulated dust.

After a 32,000 cfm Joy Microdyne dust collector was installed, maintenance was reduced to a general once-a-week cleaning. By mounting the Microdyne halfway between the car dump and a large crusher house, and connecting them with stainless steel tubing, the one dust collector serves both buildings.

The Joy Microdyne is a new kind of dust collector, 1/10 to 1/20 the size of any other collector. It is extremely efficient and simple to install and is especially suited for conditions encountered in mining and heavy industry.

If *your* operation has a dust problem, why not talk to a Joy engineer.

Write for Bulletin 284-13

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

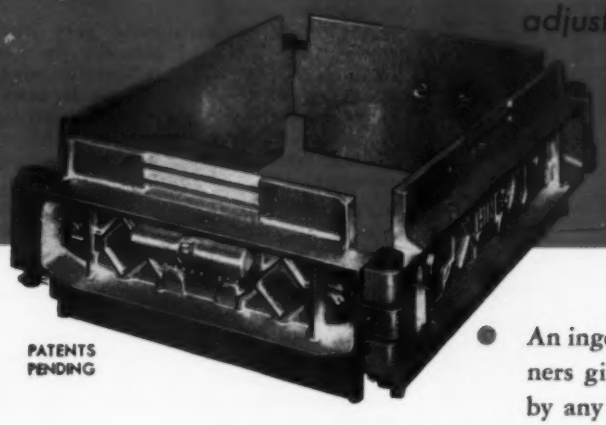
Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Circle 592 on Page 53

HINES "HI-FLEX" CAST JACKETS

Upon application to the mold, the "HI-FLEX" instantly assumes the exact shape of the mold and automatically adjusts itself to the taper of the mold.



PATENTS PENDING

One of many **HINES** *developments contributing to better foundry production*

- An ingenious pivot-pin arrangement at its four corners gives the "HI-FLEX" a flexibility unmatched by any other jacket on the market.
- Its fit on the mold can easily be changed by replacing corner pins with pins of larger or smaller diameter.
- Replaceable corner pins also permit adjusting the "HI-FLEX" to fit either slip or "POP-OFF" molds.
- Cast of aluminum or iron — jig and fixture built for maximum accuracy.
- End and side castings may be purchased separately. Filleted corner inserts and steel corner protection shields are also available.
- Lengths and widths, 10" to 30". Depths, 6", 8½", 11" and 13½". Special depths available, in half inches.

WRITE FOR CATALOG FOLDER NO. 203

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

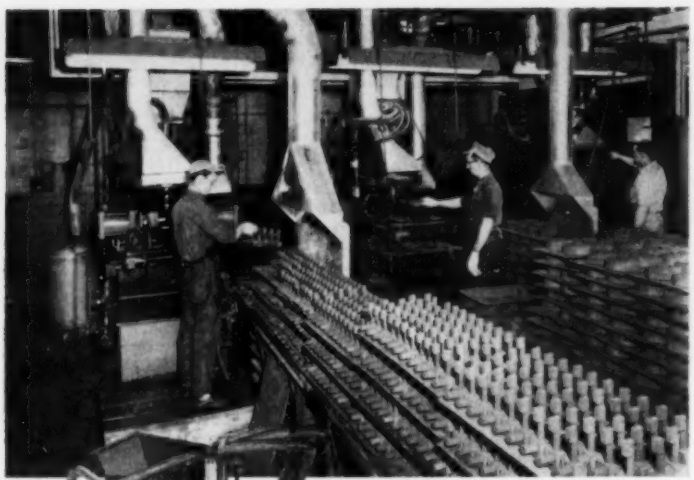
HINES FLASKS

Circle 593 on Page 53

from EATON Manufacturing Co.

"Our BLO-CORE machines have opened new fields of application for Permanent-Mold Gray Iron Castings and have made us more competitive due to net cost reductions . . . "

HOWARD U. McCLELLAND, Chief Engineer, Foundry Division



Highest quality shell cores are produced by "Blo-Core" machines to insure uniform castings for a host of industries served by Eaton Manufacturing Company's Foundry Division at Vassar, Michigan.

Millions of permanent-mold gray iron castings are produced annually by the Foundry Division of Eaton Manufacturing Company. These castings come in intricately-cored designs and shapes weighing from a few ounces up to twenty-five pounds. Great uniformity is an absolute necessity.

To meet the challenge of maintaining high quality while keeping costs as low as possible, Eaton turned to the C & S "Blo-Core" automatic shell machine. How well the "Blo-Core" performed this vital assignment can best be summed up in the above quotation of the division's chief engineer, who added: "To date we have made several hundred thousand shell cores on these machines and are very pleased with the results."

Perhaps your operation can profit from the many advantages offered by the fully automatic "Blo-Core." Our experienced engineers will be pleased to help you solve your foundry problems. Write for Bulletin CS-1622.

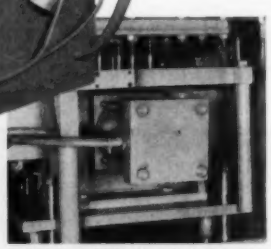
Model HI-1824 **BLO-CORE** *Automatic*

SHELL MACHINE

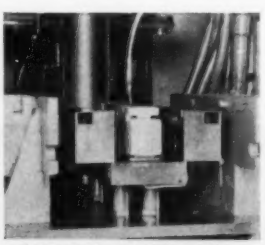
SHELL CORES—SHELL MOLDS EVERY 30 SECONDS

- Core Boxes Up to 15" x 20" x 30" High
- Mold Boxes Up to 20" x 30" x 16" Draw
- Horizontally-parted Mold Boxes
- Vertically Split Core Boxes
- 4-part Draw Split Core Boxes
- Two Station Rotary Operations. NO OVENS.

Push the Button! The box closes and the "Blo-Core" cycle commences . . .



Rotating 180°, box is indexed under blow nozzles. Mix is blown into hot box. Curing starts immediately . . .



Returning to starting position, box is opened, shell is completely cured. Stripping operation completes cycle.

C&S

PRODUCTS COMPANY
INCORPORATED

Affiliated with Barber-Greene

18656 Fitzpatrick Ave.
Detroit 28, Michigan, U.S.A.

Use These Cards . . .

FOUNDRY

- For more information on anything advertised in this issue
- For further data on products described in the Equipment and Supplies section (Page 105)
- To get copies of publications listed in the Literature for Foundrymen section (Page 170)
- To request extra copies of editorial articles

FOUNDRY — March 1959

401	421	441	461	481	501	521	541	561	581	601	621	641	661	681	701
402	422	442	462	482	502	522	542	562	582	602	622	642	662	682	702
403	423	443	463	483	503	523	543	563	583	603	623	643	663	683	703
404	424	444	464	484	504	524	544	564	584	604	624	644	664	684	704
405	425	445	465	485	505	525	545	565	585	605	625	645	665	685	705
406	426	446	466	486	506	526	546	566	586	606	626	646	666	686	706
407	427	447	467	487	507	527	547	567	587	607	627	647	667	687	707
408	428	448	468	488	508	528	548	568	588	608	628	648	668	688	708
409	429	449	469	489	509	529	549	569	589	609	629	649	669	689	709
410	430	450	470	490	510	530	550	570	590	610	630	650	670	690	710
411	431	451	471	491	511	531	551	571	591	611	631	651	671	691	711
412	432	452	472	492	512	532	552	572	592	612	632	652	672	692	712
413	433	453	473	493	513	533	553	573	593	613	633	653	673	693	713
414	434	454	474	494	514	534	554	574	594	614	634	654	674	694	714
415	435	455	475	495	515	535	555	575	595	615	635	655	675	695	715
416	436	456	476	496	516	536	556	576	596	616	636	656	676	696	716
417	437	457	477	497	517	537	557	577	597	617	637	657	677	697	717
418	438	458	478	498	518	538	558	578	598	618	638	658	678	698	718
419	439	459	479	499	519	539	559	579	599	619	639	659	679	699	719
420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720
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427	447	467	487	507	527	547	567	587	607	627	647	667	687	707	727
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721	741	761	781	801	821	841	861	881	901	921	941	961	981	1001	1021
722	742	762	782	802	822	842	862	882	902	922	942	962	982	1002	1022
723	743	763	783	803	823	843	863	883	903	923	943	963	983	1003	1023
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732	752	772	792	812	832	852	872	892	912	932	952	972	992	1012	1032
733	753	773	793	813	833	853	873	893	913	933	953	973	993	1013	1033
734	754	774	794	814	834	854	874	894	914	934	954	974	994	1014	1034
735	755	775	795	815	835	855	875	895	915	935	955	975	995	1015	1035
736	756	776	796	816	836	856	876	896	916	936	956	976	996	1016	1036
737	757	777	797	817	837	857	877	897	917	937	957	977	997	1017	1037
738	758	778	798	818	838	858	878	898	918	938	958	978	998	1018	1038
739	759	779	799	819	839	859	879	899	919	939	959	979	999	1019	1039
740	760	780	800	820	840	860	880	900	920	940	960	980	1000	1020	1040

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COMPANY _____

PRODUCT MANUFACTURED _____

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FOUNDRY — March 1959

401 421 441 461 481 501 521 541 561 581 601 621 641 661 681 701 721 741 761 781 801 821 841 861 881 901 921 941 961 981 1001 1021
402 422 442 462 482 502 522 542 562 582 602 622 642 662 682 702 722 742 762 782 802 822 842 862 882 902 922 942 962 982 1002 1022
403 423 443 463 483 503 523 543 563 583 603 623 643 663 683 703 723 743 763 783 803 823 843 863 883 903 923 943 963 983 1003 1023
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406 426 446 466 486 506 526 546 566 586 606 626 646 666 686 706 726 746 766 786 806 826 846 866 886 906 926 946 966 986 1006 1026
407 427 447 467 487 507 527 547 567 587 607 627 647 667 687 707 727 747 767 787 807 827 847 867 887 907 927 947 967 987 1007 1027
408 428 448 468 488 508 528 548 568 588 608 628 648 668 688 708 728 748 768 788 808 828 848 868 888 908 928 948 968 988 1008 1028
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411 431 451 471 491 511 531 551 571 591 611 631 651 671 691 711 731 751 771 791 811 831 851 871 891 911 931 951 971 991 1011 1031
412 432 452 472 492 512 532 552 572 592 612 632 652 672 692 712 732 752 772 792 812 832 852 872 892 912 932 952 972 992 1012 1032
413 433 453 473 493 513 533 553 573 593 613 633 653 673 693 713 733 753 773 793 813 833 853 873 893 913 933 953 973 993 1013 1033
414 434 454 474 494 514 534 554 574 594 614 634 654 674 694 714 734 754 774 794 814 834 854 874 894 914 934 954 974 994 1014 1034
415 435 455 475 495 515 535 555 575 595 615 635 655 675 695 715 735 755 775 795 815 835 855 875 895 915 935 955 975 995 1015 1035
416 436 456 476 496 516 536 556 576 596 616 636 656 676 696 716 736 756 776 796 816 836 856 876 896 916 936 956 976 996 1016 1036
417 437 457 477 497 517 537 557 577 597 617 637 657 677 697 717 737 757 777 797 817 837 857 877 897 917 937 957 977 997 1017 1037
418 438 458 478 498 518 538 558 578 598 618 638 658 678 698 718 738 758 778 798 818 838 858 878 898 918 938 958 978 998 1018 1038
419 439 459 479 499 519 539 559 579 599 619 639 659 679 699 719 739 759 779 799 819 839 859 879 899 919 939 959 979 999 1019 1039
420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000 1020 1040

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FOUNDRY

Reader Information Service

Just mail one of these cards . . . for more information on anything advertised in this issue . . . for further data on products described in the Equipment and Supplies section (Page 105) . . . to get copies of publications listed in the Literature for Foundrymen section (Page 170) . . . to request extra copies of editorial articles

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
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BUSINESS REPLY MAIL
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FOUNDRY
Penton Building
Cleveland 13, Ohio

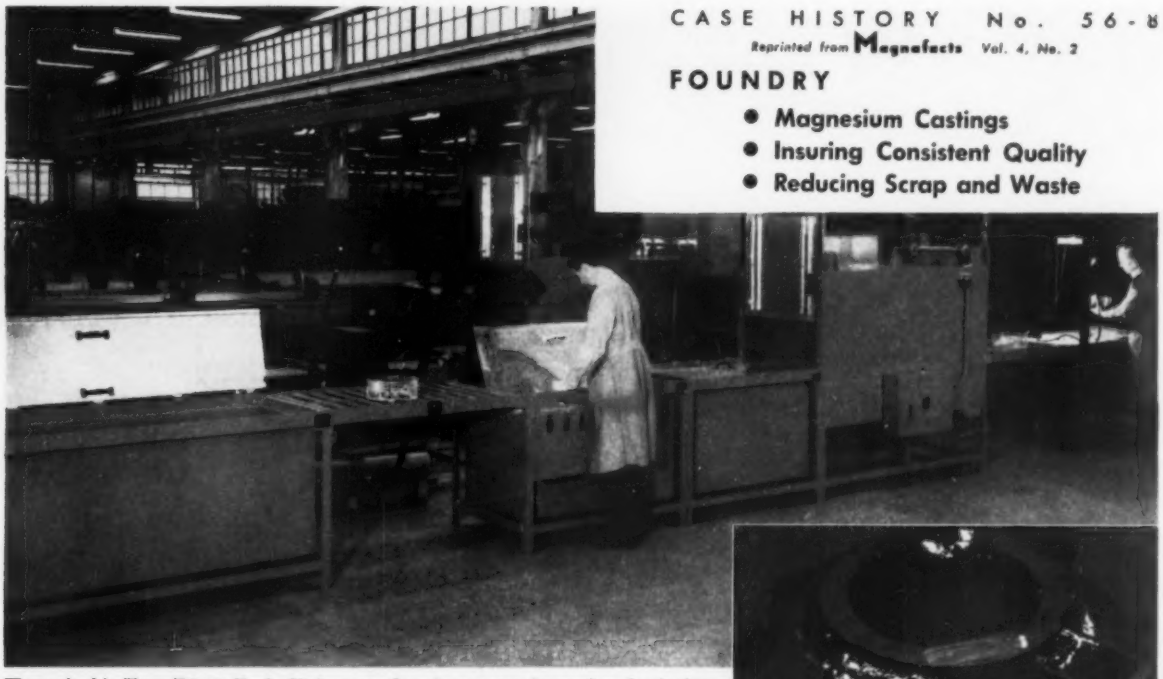
Reader's Service Dept.

CASE HISTORY No. 56-8

Reprinted from Magnafacts Vol. 4, No. 2

FOUNDRY

- Magnesium Castings
- Insuring Consistent Quality
- Reducing Scrap and Waste



Through this Type ZA-29 Zyglo Unit, parts flow in a 5-step inspection, beginning with application of penetrant at extreme left, and ending with inspection under black light at the right.

Shrinkage porosity in a magnesium casting as revealed by Zyglo. Finding the cause helps provide the cure.

Inspection Pays Off in Consistent Quality of Magnesium Castings

Magnaflux' Zyglo Also Reduces Scrap and Waste at the Magnesium Alloy Products Co.

If a typical, progressive foundryman could hang just one motto on the wall, it would probably be, "Aim for *Consistent* Quality". He doesn't mean "perfection" — he means that every casting produced should be job-worthy for its purpose.

The Magnesium Alloy Products Co., of Compton, California, is a good example of what such an aim can accomplish. Through modern processes and a well planned inspection system centering around Zyglo Fluorescent Penetrant Inspection, it has achieved high consistent quality, while reducing scrap losses and waste.

"To prevent excessive scrap from occurring," explains L. M. Nash, Metallurgist for the company, "it is necessary for the inspection department to catch a faulty casting as soon as possible—first, to isolate it so that no further labor or time will be wasted on it; and second so that the quality control department can make corrections before too many castings are poured.

"An average molder with an average squeezer pattern will produce about six molds an hour. The pouring, cooling and shakeout will require about 30 minutes, so that by the time the first casting reaches the first or 'hot inspection' there are probably four to six molds already made.

"If this casting contains a flaw that is not seen by the inspector, it may be several hours before the trouble is found at a later inspection point. It is therefore vitally important that the inspection department be given every facility needed to locate trouble spots as soon as possible.

"The defects we look for with fluorescent penetrant inspection are cold shuts, cracks, blows, shrinkage, and dross.

"Zyglo inspection has many advantages to fit our inspection needs at Magnesium Alloy Products Co. The cost of material used per casting is low and the process fast enough to keep up with production and give us quick and accurate answers. And there is no objectionable residue left on the castings to interfere with subsequent operations.

"The final big advantage to us, of course, is that besides reducing scrap, lost time and waste, we are now able to turn out a better quality casting."

FOR YOU, *TOO—Magnaflux Test Systems can help to increase the yield of usable castings — and foundry profits! See your MX Engineer or write for details*

THE HALLMARK OF QUALITY IN NONDESTRUCTIVE TEST SYSTEMS

MAGNAFLUX CORPORATION

7350 W. Lawrence Ave., Chicago 31, Illinois

NEW YORK 36 • PITTSBURGH 36 • CLEVELAND 15 • DETROIT 11 • DALLAS 35 • LOS ANGELES 22

Circle 595 on Page 53

with the *Exclusive* fine FANNER FAN-S-CHILLS

provide superior chilling and greater savings

A triumph of modern research and engineering — the FAN-S-CHILL, through its curved "S" design, provides 75% more chilling surface since there is no solid mass.

Exclusive design with its perforated surface and double channel permits maximum parent metal fill-in . . . fuses into cast metal solidly, completely . . assures better quality castings.

Formed steel fabrication provides highest possible chilling efficiency . . . ideal for general chilling purposes . . . especially in steel.

Lightweight construction provides triple savings — in cost, in shipping and in handling.

Get the facts on the many cost saving features of the fine FANNER FAN-S-CHILL . . . write today for samples and latest prices.

SPECIFICATIONS:

WIDTH: ⅜" — ⅝" — ¾" — 1" — 1¼"

LENGTH: ½" to 5"

Made in heavy, medium and light gauges.

Copper, aluminum or tin coated.

Lighter or heavier FAN-S-CHILLS in special sizes can be made on request.

ENGINEERING SERVICE:

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of FINE FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK CLEVELAND 9, OHIO

CURVED "S" DESIGN

LIGHTWEIGHT

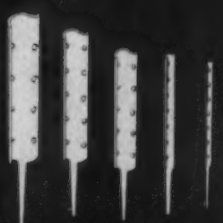
Savings in cost. Lower shipping charges. Easier to handle on the job.

GREATER FUSION

No pockets to trap gases. Perforations permit metal flow-through. So completely fused, difficult to detect even with X-ray.

GREATER CHILLING SURFACE

75% greater chilling area since there is no solid mass — produces better castings.



5 STANDARD SIZES

The ideal chill for a wide range of applications. A size for every need — eliminates makeshift chilling.

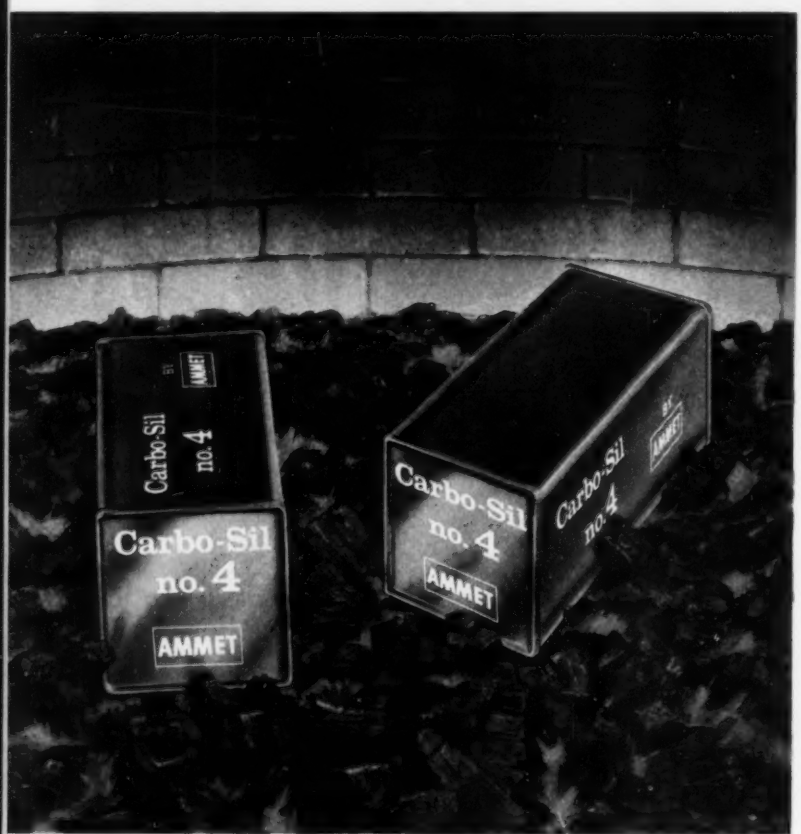
Circle 596 on Page 53

CARBO-SIL® No. 4*

The Only Low-cost and Consistent Method of Adding Silicon Carbide in Your Cupola

A positive silicon source that:

* Cuts Costs
* Increases Machinability
* Improves Fluidity
* Controls Chill



CARBO-SIL No. 4, a silicon carbide addition for cast iron cupolas, comes in 10 and 15-pound units encased in steel containers.

BECAUSE CARBO-SIL No. 4 comes in steel containers, every crystal of the precrushed silicon carbide is *fully* protected until it reaches the significant melting zone of the cupola. Then it *completely* reacts and goes into solution.

CARBO-SIL No. 4 is competitively priced with silicon carbide in briquette form. You save money because there's no waste. If briquettes are made sturdy, they only partially dissolve and often are found in the drop. If made fragile, they break up prematurely and are partially blown out the stack.

There are 4½ pounds of available silicon (as silicon carbide) in the 10-pound unit and 6¾ pounds in the 15-pound unit. Each container adds almost a pound of steel to your charge at no extra cost.

Write for details.

Safe Outdoor Storage

CARBO-SIL No. 4 is packed in palletized, waterproofed and top-strapped units for space-saving outdoor storage.

AMMET

AMERICAN METALLURGICAL PRODUCTS COMPANY

3600 FORBES AVENUE / PITTSBURGH 13, PA. / PHONE MUSEUM 2-7031

Circle 597 on Page 53

Readers' Comment

Foundrymen in Florida

To The Editors:

For some time, I have realized that a number of individuals formerly associated in various ways with the foundry industry now reside through the winter or the year round in Florida. I am sure all of these individuals would like to meet their fellow foundrymen here in the Sunshine State, but do not know where they are located.

From a human interest standpoint, I am wondering if a page in your magazine could be devoted to "Foundrymen in Florida" throughout the winter months—say, from December through March. I am sure it would be well appreciated, since all of us old timers would then know where our former friends and acquaintances are located. I feel sure that if this "Retiree" page in your magazine is established, it will become very popular and it would bring together a nice group of individuals still having the foundry industry at heart.

I would appreciate your letting me know if this idea would have any interest. Rest assured I will do my part to send names of individuals who reside here through the winter and also make Florida their home.

Edward C. Hoenicke
2725 N.E. 29th Court
Ft. Lauderdale, Fla.

Idea Contains Hazards

To The Editors:

One of our members sent us a copy of page 116 from the December, 1958 issue, carrying a "How To Do It" idea on an easily made oxygen lance. We have no quarrel basically with the idea, and feel that such ideas, when properly presented, can be helpful both to our industry and to yours. However, there are several points in this particular article which we believe represent possible hazards.

First, you will note that the author simply mentions that a hose is attached to an oxygen cylinder with no instructions to the effect that a suitable pressure reducing regulator should first be connected to the oxygen cylinder. In fact the illustration does not show a regulator. Please refer to Para. N-11 of the attached "Safe Practices for Installation and Operation of Oxy-Acetylene Welding and Cutting Equipment" pamphlet which states that oxygen shall never be used from a cylinder without reducing the pressure through a suitable pressure regulator.

Second, there is no information given as to the proper type of hose to be used with oxygen in this setup. Para. I-1 of our pamphlet states that hose for oxygen service shall comply with the joint standards of the International Acetylene Association and the Rubber Manufacturers Association.

Third, we believe that a short length of nonferrous pipe should be incorporated in the lance end of this assembly to act as a burnback barrier.

Fourth, all parts, such as the valve, valve packing, etc., should be suitable for oxygen service and the pressures involved.

Fifth, all parts of the setup should be thoroughly cleaned for oxygen service and kept free from oil and grease. Oxygen may react readily with oil and grease (see Para. N-8 of attached pamphlet).

R. M. Neary
International Acetylene Association
30 East 42nd Street
New York 17, N. Y.

Advice Solves Problem

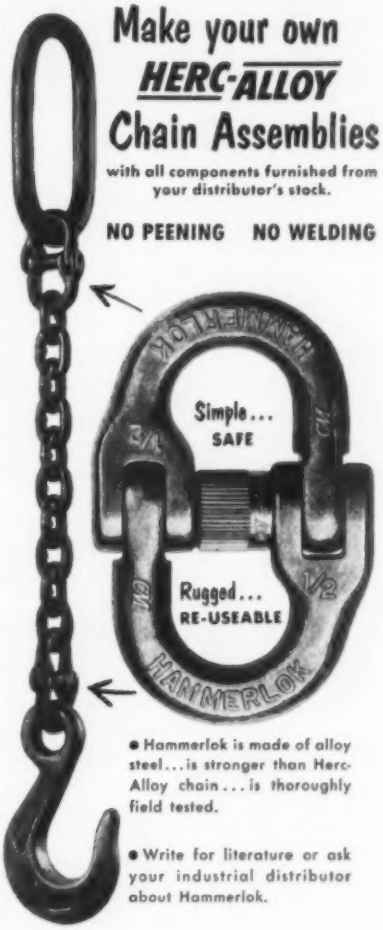
To The Editors:

Thank you for your kind reply on our questions on cracks in the large 13 Cr stainless steel rolls (November, 1958 issue).

According to your advice we tried five more pieces and obtained four good rolls. The one failure was due to insufficient metal poured, resulting in too thin a section for proper machining.

We decreased the casting tem-

CM
Hammerlok®
COUPLING LINK



Make your own HERC-ALLOY Chain Assemblies
with all components furnished from your distributor's stock.

NO PEENING NO WELDING

● Hammerlok is made of alloy steel... is stronger than Herc-Alloy chain... is thoroughly field tested.

● Write for literature or ask your industrial distributor about Hammerlok.

● MADE BY the makers of Herc-Alloy... the original alloy steel chain.

CM HOISTS AND CHAIN

COLUMBUS McKINNON
CHAIN CORPORATION
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DISTRICT OFFICES: NEW YORK
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In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario
Circle 598 on Page 53

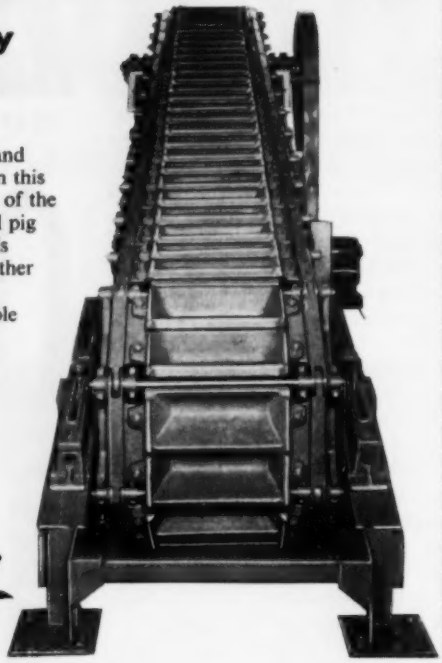
Circle 597 on Page 53

CONTINUOUS OPERATION

For Foundry Pig Casting

Sharply reduced down-time and maintenance costs result from this design which eliminates 80% of the moving parts of conventional pig casting machines. Idler wheels are mounted on the frame rather than on the moulds, thus keeping them as far as possible from the hot metal.

Bailey Pig Casting Machines are made in capacities from 3 to 50 tons per hour. Sizes: 15 to 125 feet, in multiples of 5 feet.



Bailey

PIG CASTING MACHINES

perature of the 13 Cr steel, spinning speed, and pouring rate. Also after pouring we threw some exothermic material in the bore. Through those procedures we obtained satisfactory results.

As your suggestions were correct, we deeply appreciate your assistance.

TORU TAKI
Kubota Iron & Machine Works Ltd.
Chuko Plant, Osaka, Japan

Favors Rubber Molds

TO THE EDITORS:

The processes described on page 95, January issue, under the heading "Molds for Casting Lead," would not be economical. Several companies are successfully producing lead and tin-base alloy items, such as fishing lures, by casting directly into a rubber mold. These rubber molds are simple to make and relatively inexpensive. Up to several hundred pours can be made in a rubber mold before it would have to be replaced.

This type of casting also is used by foundries for the reproduction of patterns from a single master, and also for the production of metal letters that are placed on nameplates, memorial markers, etc.

Besides doing the actual casting of these items, we also manufacture and sell the casting machinery and supplies used in this process of casting.

J. A. ZANNINI
National Cast Products Co. Inc.
121 *Dyer St.*
Providence 3, *R. I.*

Cup, Saucer, and Spoon

TO THE EDITORS:

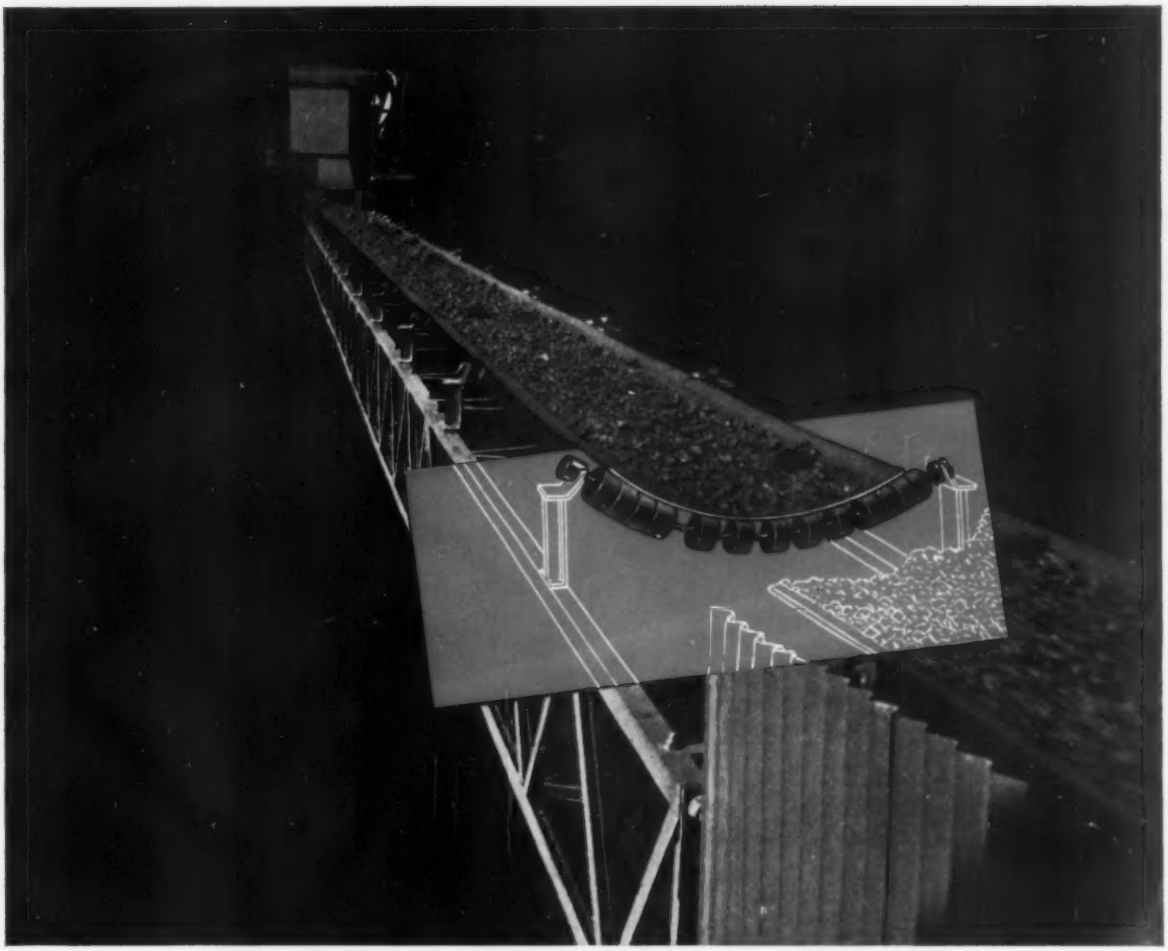
I will appreciate any information regarding a description of the molding of a cup, saucer, and spoon in green sand in a two-part mold.

I retired in 1951, and in 1957 the West Allis School of Vocational and Adult Education asked me to teach foundry and foundry technology. I like the work very much.

WILLIAM W. ZIEMER
221 *S. 67th St.*
Milwaukee 14, *Wis.*

Editor's Note: We have sent a photostat of the article, "The Cup, Saucer, and Spoon" by Pat Dwyer, late engineering editor of FOUNDRY, from the May, 1951, issue.

Circle 598 on Page 53



JOY LIMBEROLLER . . THE *easy going*
BELT CONVEYOR IDLER WITH PLENTY OF BACKBONE

Radically different from all other idlers, the Joy Limberoller is a flexible steel cable suspended between two sealed bearings . . . neoprene discs are molded to the cable . . . forming a single roll idler which turns on its own axis. This imparts a flexing action which is self-cleaning . . . prevents material build-up, a source of trouble with conventional idlers.

The Joy Limberoller idler supports the belt across its entire width in a true catenary . . . doesn't bend or pinch the belt between steel rolls like conventional idlers. Hard materials don't "bump along" from idler to idler, either. Belt life is increased 20% and more.

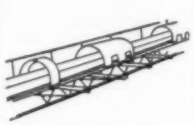
Abrasive or corrosive materials are no problem, because only two bearings are used. They are up out of the dirt zone, not hiding down under the belt where inspection and maintenance are difficult. Joy Manufacturing Company has never replaced a single bearing due to normal failure. Heard enough? Get the whole story from:

Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited: Galt, Ontario.

WSW L7373-269

WRITE FOR BULLETIN 269-13

INDUSTRIAL COMPRESSORS



CONVEYORS

ELECTRICAL CONNECTORS

FANS AND BLOWERS

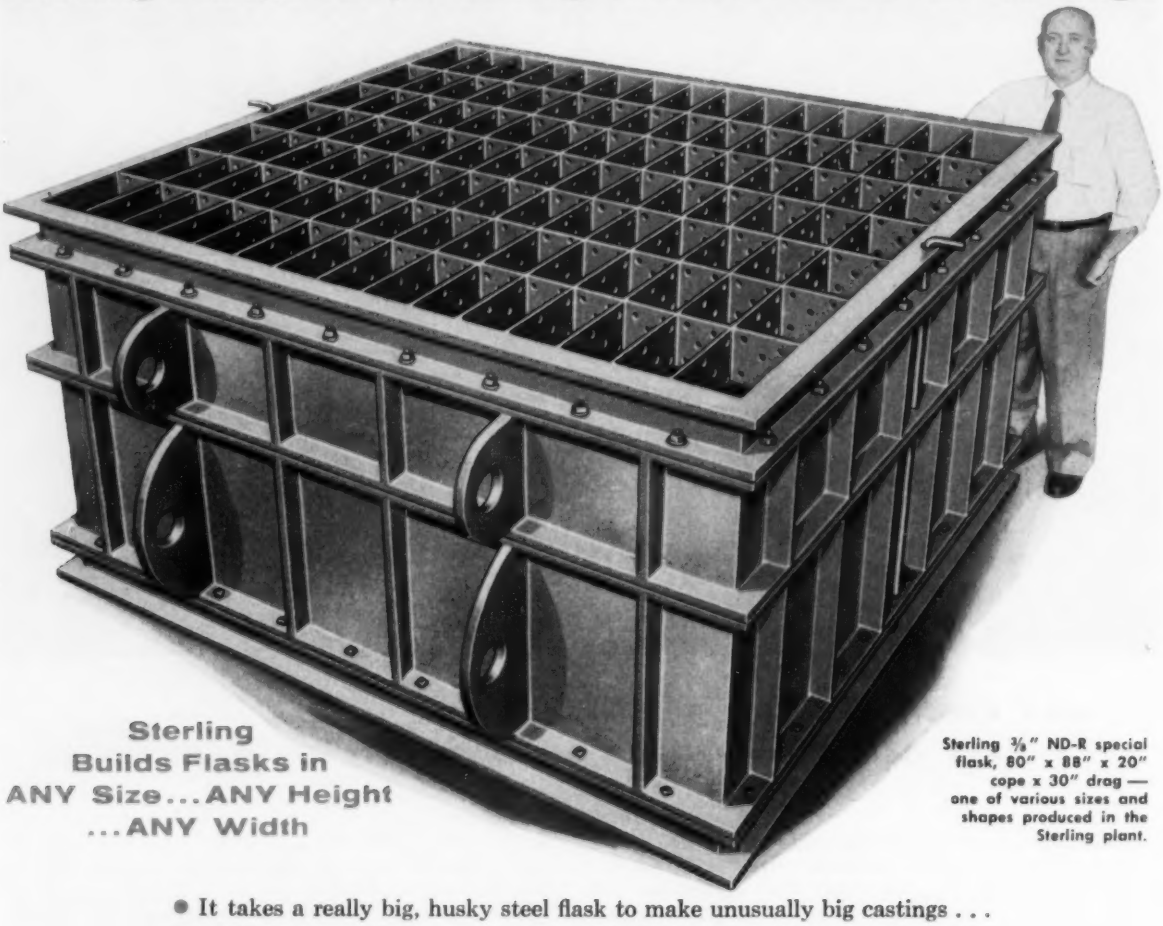
JOY

SINCE 1851 . . . OVER 100 YEARS OF ENGINEERING LEADERSHIP

Circle 600 on Page 53

BIG 3½ TON FLASK

Well-known Pennsylvania Grey Iron Foundry Uses Sterling Flasks for producing Massive 4000 lb. Castings



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WHEREVER METALS ARE CAST FOUNDRY
March 1959

Show Them Castings

During the holidays, a fellowship student in metallurgy visited our office to obtain data for a paper dealing with the foundry industry and its future. Before we could get down to consideration of the reason for the call, curiosity caused him to make the following comment and ask a question: "For over a year I have been studying FOUNDRY. In that time the editorial in each issue has dealt with the subject of selling castings, either directly or somewhat subtly. Why do the editors place so much stress on that subject?"

The answer was simple. Of all the many problems facing producers of castings—and they are varied, complex, and important—that of maintaining old markets and seeking expanded outlets through new applications seems to be the most critical. For many years foundrymen have paid much attention to the production of castings, frequently at the expense of selling. Recently, a shift of emphasis has been developing. Today, individual companies and groups of foundries are moving forward with modern marketing programs.

A merchandising program has many facets, one of which is the trade show. Foundrymen are fortunate to have such a show, a show designed especially to tell design engineers, purchasing agents, and others among their customers of the availability, application, properties, and versatility of castings for almost every type of engineering construction.

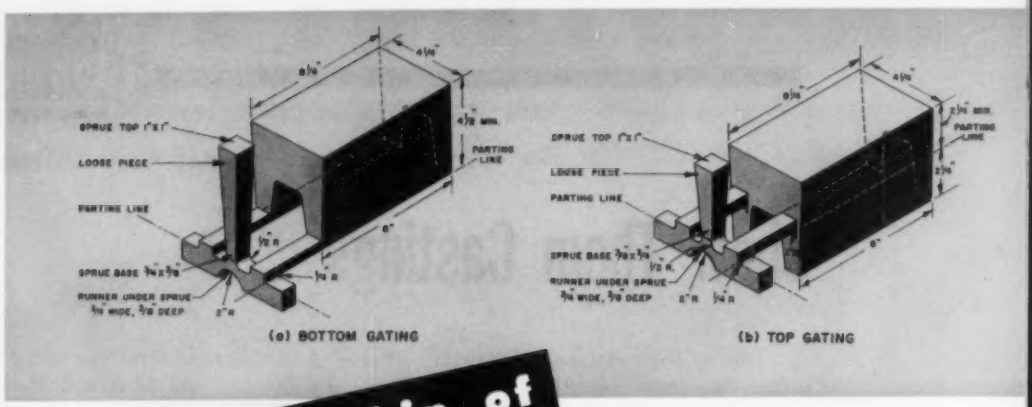
The Engineered Castings Show, first held in Cincinnati in 1957 by the American Foundrymen's Society, will be staged for the second time April 13-17, in the Sherman Hotel, Chicago. More than 70 companies have taken space at the show, and it is anticipated that the number of exhibits will increase considerably before the show opens. The displays will occupy approximately 20,000 sq ft of floor space.

The technical program for the AFS Congress includes many papers which will present detailed information on the problem of modern design, metals, materials, properties, specifications, and applications. The society is directing promotion to more than 50,000 design engineers and castings buyers, stressing the benefits to be obtained through show attendance.

Since Chicago is one of the country's important manufacturing centers, the 1959 Engineered Castings Show of AFS should draw an excellent audience of interested designers and buyers. To those progressive foundries who exhibit, it should offer an unusual opportunity for furthering the sale of cast products.

Frank G. Steinebach
Editor

Fig. 1—Double keel block test bar (from *ASTM Standards, Nonferrous Metals*). Left, bottom gating. Top gating at right



Relationship of TEST BAR and

Differences between properties of separately cast test bars and those of production castings must be considered to avoid incorrect conclusions about the castings' mechanical properties

By W. J. REICHENECKER
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● A COMMONLY used inspection practice associated with sand-cast, nonferrous alloys is that of tensile testing separately cast specimens to determine the mechanical properties of a given lot of material.

Results obtained are compared with minimum values indicated in the relevant specification. If the test bar properties meet or exceed the specified minimum values, the lot of material or castings which the test bars represent is considered acceptable. Should test bar values fall below the required properties, the material or castings are subject to rejection.

This procedure appears simple and straightforward; however, the basic differences between the properties of separately cast test bars and those of production castings must be considered to avoid drawing incorrect conclusions.

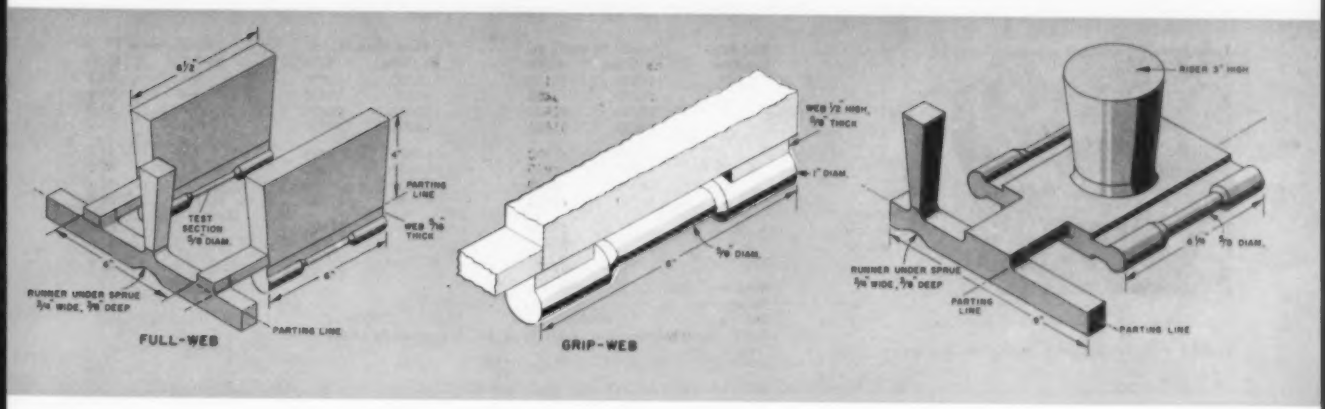
The properties of separately cast test bars often are assumed to be equivalent to those of the castings represented by the test specimens. Since this is not true, serious difficulties can be encountered if castings are designed and inspected on this basis alone. Fortunately, safety factors usually are sufficient to avoid service failures. Whether these safety factors are borderline or excessively large is difficult to establish without more accurate knowledge of the actual properties developed in the casting and information regarding the exact requirements of the application. Better information along these lines should result in more efficient use of cast materials.

Separately Cast Test Bars—Considerable attention has been given to the problem of designing cast test bar specimens, as illustrated by the variety of test bar designs in current use. Even today, foundrymen do not always agree on the selection of a particular test bar design for a given alloy. Fig. 1 to 5 show several typical test bar designs commonly used for nonferrous alloys. Modifications of these designs also are prevalent.

Generally, certain specific designs are favored for particular groups of alloys, depending on the foundry characteristics of the alloys. For example, the keel bar shown in Fig. 1 is most often used for alloys of

Fig. 2—Full-web and grip-web test bars. Illustrations from *ASTM Standards, Nonferrous Metals*

Fig. 3—Double horizontal full-web bar. From *ASTM Standards, Nonferrous Metals*



CASTING PROPERTIES

short freezing range, such as aluminum bronze or manganese bronze. The designs shown in Fig. 2 and 3 are usually used for tin bronze, leaded tin bronze, and red brass alloys. Aluminum alloys are normally cast in the test bar designs illustrated in Fig. 4 and 5.

The problem of manufacturing test bars which will satisfactorily meet or exceed the minimum requirements of the relevant specification is not solved merely by selecting the appropriate test bar design. Melting practice, pouring temperature, moisture content of the mold, mold permeability, and other factors must be controlled so that the test bar quality is not jeopardized.

In the manufacture of production castings, once the particular combination of processing variables has been established so that consistently satisfactory quality is obtained, this procedure is followed in production of future lots of this casting. For different castings, the procedures used will vary since different section thicknesses and variations in over-all casting size and geometry will influence the choice of techniques to be employed.

In the same manner, the test bar represents a specific design of casting and necessitates individual treatment in its manufacture. Therefore, the practice which gives most satisfactory results in the casting may not yield equally satisfactory results in the test bar.

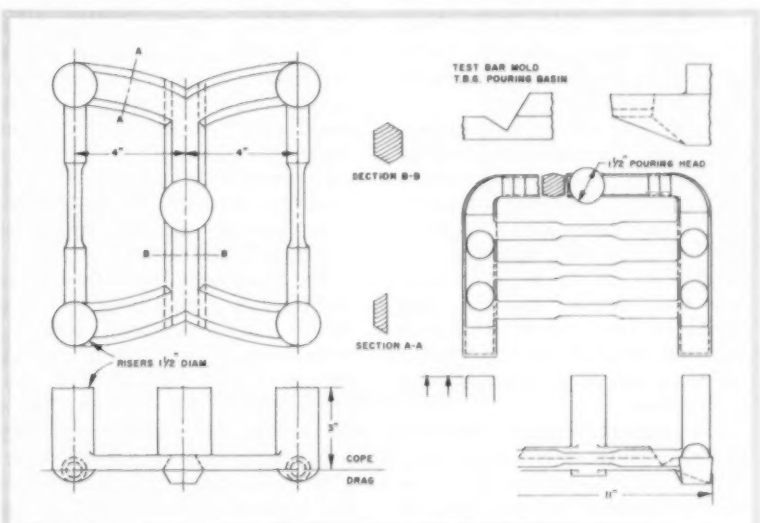
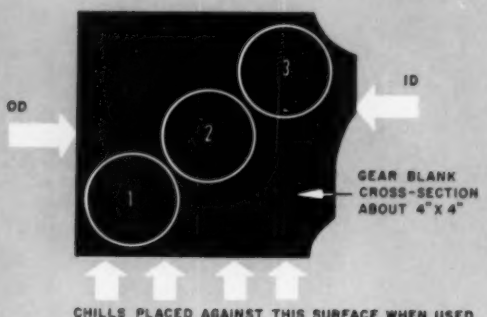


Fig. 4 (left) and 5—Typical designs of test bars for aluminum alloys. From "Casting Alcoa Aluminum," published by Aluminum Co. of America

Fig. 6—Comparative mechanical properties of tin bronze gear blank cast with and without the use of chills



Test Bar Location	Tensile Strength, psi		Yield Strength, psi		Elongation in 2", %	
	No Chills	Chills	No Chills	Chills	No Chills	Chills
1	19500	53100	15000	20600	10.5	50.7
	20600	53400	15500	20400	8.4	49.8
	20400	52900	15000	24800	11.8	53.5
	19600	51600	14000	20900	10.1	51.0
2	15000	47100	12300	19200	4.1	34.3
	17400	47800	12800	20000	7.5	40.8
	18000	48500	12500	21600	7.6	42.2
	16700	43500	12800	21200	8.0	26.8
3		37800		21200		20.5
		33400		17100		27.8
		35200		20000		17.2
		36000		21200		17.5
Minimum values for separately cast test bars		40000		18000		20

NOTE: No specimens were taken from No. 3 position in unchilled casting.

On the other hand, the preparation of good quality metal up to the point of pouring the casting and the test bar is one point of similarity. Thus, the test bar results will reflect poor melting practice, and when metal has been improperly handled the castings cannot be expected to possess good properties.

At the same time, properly melted metal which yields good test bar results will not give good castings if the gating, risering, or molding practice associated with the castings are poorly conceived and executed. Therefore, the primary value of the separately cast test bar is a gage of metal quality; the over-all strength and quality of the production castings can be determined only by testing representative production castings.

In the case of heat-treated materials, the separately cast test bar also provides a means of determining whether the material responded to heat treatment as expected or whether the heat treatment was improperly performed. To draw these conclusions, the test bars should be heat treated with castings, and certainly the test bar and casting should be processed together in any event.

There may be cases, however, wherein differences in section thickness, extreme differences in size or other differences between the castings and test bars make it necessary to use slightly different heat treating times for the casting and test bar, but if done under competent metallurgical supervision this does not change the value or significance of the test bar results.

Test Bar vs. Casting Properties—As stated earlier, there is a tendency to assume that the properties derived from tests on separately cast test specimens are equivalent to the properties of the casting represented by the test bars. This assumption is false. Usually, the properties of the actual casting are less than those measured on the test bar and, in fact, may be lower than the minimum values established for separately cast test bars.

On the other hand, there are means at the foundrymen's disposal to offset, at least partially, this behavior. Judicious use of chills in the mold, evaluation of gating and risering practice, and close control of and use of proper pouring temperature are some important factors in obtaining better mechanical properties in castings. At best, however, there will be some differences between test bar properties and those of the casting.

The example in Fig. 6 shows how test bar and casting properties may differ. The information was obtained on a rather large gear blank casting of a tin bronze alloy having a cross section approximately 4 in. square. The casting normally is made in a conventional green sand mold, gated in several places on the inside diameter and fed by post risers on the top surface. Mechanical properties were determined on standard 0.505-in.-diam tensile bars machined from the casting. Although the specified minimum properties for separately cast test bars are 40,000 psi tensile strength and 20 per cent elongation in 2 in., the actual properties obtained on specimens machined from this casting are considerably lower, showing an average tensile strength of about 18,000 psi and elongation in 2 in. of 8 per cent.

To improve the properties of these gear blanks, chills were placed in the mold so that the drag portion of the casting was adjacent to the chills. Test bars machined from this casting showed considerable improvement in mechanical properties. In this case, the average tensile strength, yield strength, and elongation in 2 in. are significantly better than those of the unchilled casting and in most instances are in excess of the minimum values expected in separately cast test bars.

Although only this one example is presented, other cases could be cited to illustrate the difference between properties of castings and those of test bars.

Effect of Section Size—One of the factors having a strong influence on the mechanical properties of cast alloys is the thickness of the cast section. Most casting alloys show a definite trend toward lower mechanical properties as the section thickness increases. The degree to which the properties are influenced varies widely with the different alloys.

The graphs in Fig. 7 show the relationship between mechanical properties and as-cast section

thickness for a number of different nonferrous materials. These data were obtained on test bars machined from a casting specifically designed to obtain various section thicknesses in the same casting. A sketch of this casting and one gating and riser arrangement is shown in Fig. 8. Test bars of materials normally used as cast were machined from the different sections of the casting and subjected to tensile test. In the case of heat-treatable materials, the step bar casting was heat treated prior to machining.

As indicated in Fig. 7, alloys such as aluminum bronze (A) and manganese bronze (B) show little change in properties with section thicknesses up to about 2 in. Tin bronze (C) and leaded tin bronze (D), however, are prone to lose strength and ductility as section size increases. Aluminum alloy (E) shows only a small loss in properties with increasing section thickness.

Similar work on the effect of section size on the properties of several grades of gray cast iron has shown significant decreases in strength with increase in section size. This information is not presented with the intention of discouraging the use of alloys which are strongly affected by changes in section size, but rather it is intended that the designer be made aware of this behavior so that proper attention can be given this phenomenon when designing castings.

Effect of Temperature—Associated very closely with the relationship between section size and mechanical properties is the effect of pouring temperature upon properties. Higher pouring temperatures usually result in lower mechanical properties if all other factors are equal. Since lower pouring temperatures can be used as the section thickness of the casting increases, the effects of pouring temperature and section thickness on mechanical properites tend to counteract each other. Seldom do these effects exactly balance one another.

To explain the decrease in properties with increasing section size and pouring temperature, it is necessary to consider how grain size, soundness of material, and chemical composition (segregation) are affected by cooling rate. First of all, it can be stated that grain size, soundness, and chemical composition all affect the properties of cast metals. Generally, mechanical properties are improved as the grain size becomes smaller. Furthermore, it should be obvious that as the soundness of the metal increases, the mechanical properties will be improved. With regard to chemical composition it can be said that the mechanical properties are directly related to this factor but whether they are altered by specific changes in composition depends a great deal on the alloy system involved.

Grain size, soundness, and chemical composition are influenced by the rate at which a casting solidifies or cools. The slower the solidification or cooling rate the more likely will be the tendency for the cast material to exhibit larger grain size and variations in chemical composition from point to point due to segregation. Soundness also may be affected adversely by slower cooling rates since control of directional solidification becomes more difficult in sand castings as the cooling rate decreases; therefore, a greater degree of unsoundness due to shrinkage porosity may result. Both higher pouring temperatures and larger section thicknesses tend to promote slower solidification or cooling rates.

Where the designer needs premium quality for his application, the foundryman may find it necessary to resort to extensive chilling, precise control of pouring tempera-

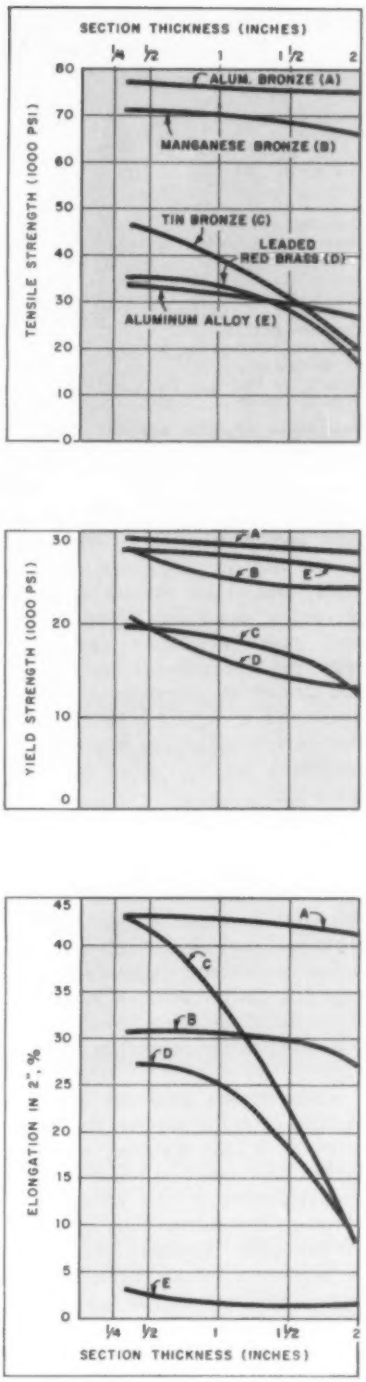


Fig. 7—Influence of section size on properties of some nonferrous sand cast alloys

Nominal Composition—Per Cent

Aluminum Bronze A		Manganese Bronze B		Tin Bronze C		Leaded Red Brass D		Aluminum Alloy E	
Fe	2.3	Cu	58	Cu	88.0	Cu	85.0	Cu	1.3
Al	9.0	Fe	1.5	Sn	8.0	Sn	5.0	Si	5.0
Cu	Bal	Al	0.8	Zn	4.0	Pb	5.0	Mg	0.5
		Mn	0.8			Zn	5.0	Al	Bal
		Zn	Bal						

Note: Aluminum alloy was heat treated (T6)

TABLE I—Proposed New Form for Presentation of Mechanical Properties of Cast Alloys for Design Purposes

	Aluminum Bronze A	Tin Bronze C	Aluminum Alloy E
Tensile Strength, psi			
Separately cast test bar, min.	65000	40000	32000
¾" and under	76000	44000	32000
Over ¾" to 1½"	75000	31000	29000
Over 1½" to 3"	75000	15000	26000
Yield Strength, psi			
Separately cast test bar, min.	25000	18000	20000
¾" and under	27000	18000	27000
Over ¾" to 1½"	26000	16000	26000
Over 1½" to 3"	25000	12000	25000
Elongation in 2", %			
Separately cast test bar, min.	20	20	2.0
¾" and under	45	40	2.5
Over ¾" to 1½"	43	25	1.5
Over 1½" to 3"	41	7	1.0

Note: Values shown are only examples to indicate form of presentation and are not intended as minimum design values. Furthermore, all values are averages unless otherwise noted.

ture and pouring rate, more extensive and complex gating and risering, and closer control of other processing variables. When necessary, these techniques should be employed to obtain the best quality and properties; otherwise an application for a casting may be satisfied only by changing to a forging, weldment, or other type of fabricated part.

Casting Design—For many years, mechanical aspects of casting design have been predicated on properties obtainable in separately cast test bars. Inasmuch as considerable variation may exist between test bar properties and those of the casting, it appears desirable to take a somewhat different approach to establishing design properties for castings.

Since section thickness exerts a significant influence on the properties of a cast material, it seems logical to attempt to relate directly the properties of the various cast alloys to this factor. This is not an unreasonable approach since the properties of many wrought materials in common use are related to section thickness.

To illustrate this idea, a suggested tabulation is presented in Table I. Here, minimum values for separately cast test bar properties are shown along with average values in relation to section size. Although this may be a little confusing, the intent is to illustrate a method or form for presenting data which can ulitmately have greater significance than test bar values alone. With considerably more work the tabulation could show minimum values for separately cast test bars for *inspection* purposes and minimum values for various section thicknesses for *design* use.

Casting Inspection — Although separately cast test bar results often are used as a basis for acceptance or rejection of a group of castings, such information by no means tells the whole story. Since the test bar is of primary importance in gaging, the foundryman's ability to process the metal properly up to the point of pouring, and to satisfactorily accomplish heat treatment where necessary, the test results can provide a measure of whether the metal used in making any specific group of castings is of satisfactory quality. As for the castings, other techniques must be used to fully establish their quality. These techniques may be grouped under the headings of destructive and nondestructive tests.

Nondestructive tests use hardness measurements, x-ray studies, fluorescent penetrant examination, magnetic particle inspection, and, of course, visual inspection either with the unaided eye or a low-powered magnifier. Much can be learned about the over-all quality of a casting from these tests without rendering it unusable for the intended application. Minimum standards whereby casting quality can be judged by these tests are somewhat difficult to establish, and in many cases the final judgment depends on the skill and experience of the individual interpreting the results. This is particularly true in the case of x-ray and fluorescent penetrant examination.

Destructive tests lend themselves more readily to evaluation of the casting design prior to committing it to production. Load-deflection tests, determination of breaking loads, stress distribution studies by means of strain measurements, and actual sectioning of the casting—all fall into this category. Usually these tests are not compatible with inspection of production castings, but they are useful in arriving at design or foundry practice modifications necessary to obtain the desired quality and service behavior.

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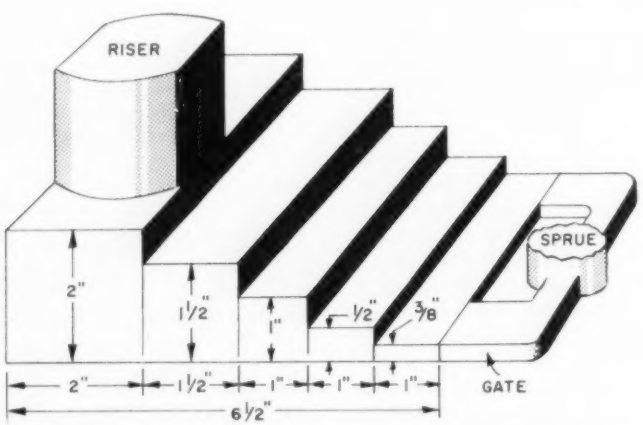

Fig. 8—Step plate casting used in studies of effect of section size on properties of cast alloys. Gating arrangement shown is only one of several used with this type of test specimen

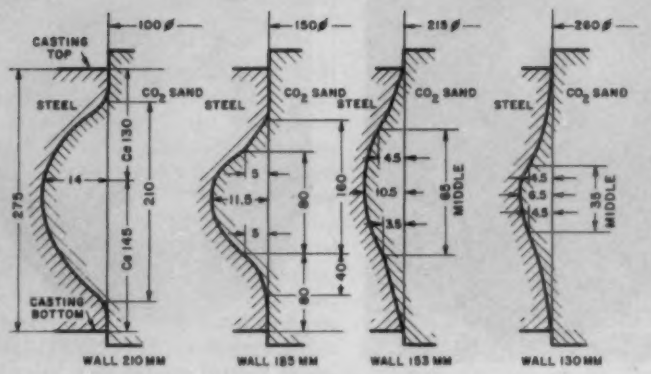

Fig. 1—Showing variations in round core deformation

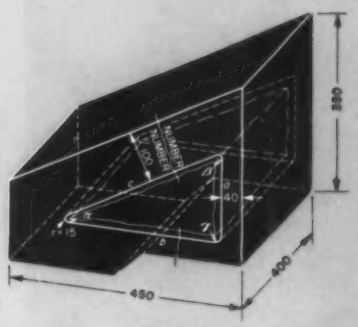

Fig. 2—Pattern for test pieces

Developments in Use of

The Carbon Dioxide Process

Investigations indicate that quartz sand is not the ideal molding material for the CO_2 process in production of heavy-walled castings. Carbon dioxide is used most economically when heated before gassing

By DR. WALDEMAR SCHUMACHER
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● IN MANUFACTURE of heavy-walled castings, not only penetration at the bottom parts of the castings, but also certain deformations in interior cores which affect the dimensional accuracy of the castings, frequently can be observed.

Fig. 1 shows the barrel-shaped swelling that occurred in 50-mm-diam round cores made from quartz sand and silicate binder and gassed with carbon dioxide, as well as those made with quartz sand and core oil, and ultimately with quartz sand and bentonite. All cores show certain deformations, the CO_2 process cores having a 10-mm change in diameter.

An examination of a series of heavy-walled castings with round cores showed that this change in diameter occurred nearly everywhere with use of round quartz sand cores. This led to the conclusion that as long as no cracks or fissures appear in the internal cores, expansion in the middle of the core, measured around the circumference, amounted to about 13 to 14 per cent. On exceeding this value, occurrence of cracks or fissures is to be expected.

It is of interest that with carbon dioxide process cores no peeling occurs, in contrast to the case of similar large cores made with synthetic sand and bentonite addition. To find the cause of these failures, a series of tests was carried out on a number of molding materials to determine their serviceability against penetration and resistance to deformation.

Test Specimens—For the investigation a pattern of the dimensions shown in Fig. 2 was prepared. The pattern had wall thicknesses which varied between 40 and 100 mm. Individual attention was practiced with the castings which had reentrant edges at the acute angle between sides B and C. The cores were hard rammed.

To eliminate the influence of pouring temperature on the results, a perforated disc (Fig. 3) was employed in further tests. This permitted simultaneous use of eight round and eight triangular cores of the same volume. The cores

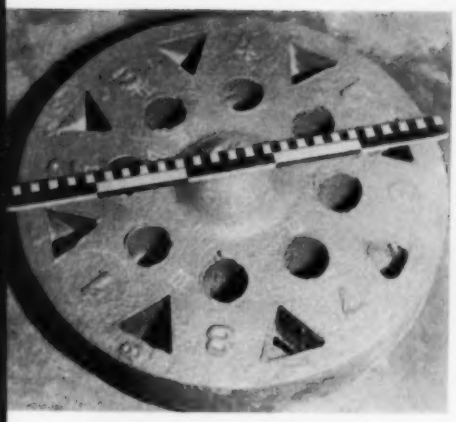
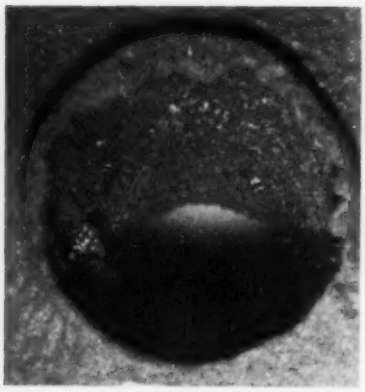


Fig. 3—Perforated disc used in the study of metal penetration



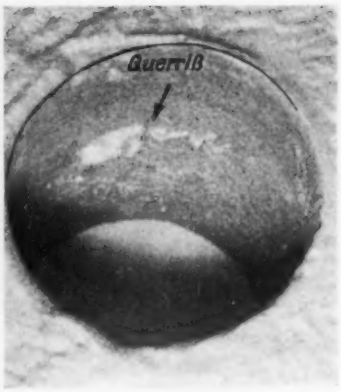


Fig. 4—Example of diversified configurations of bores in perforated disc. Longitudinal crack shown at left, transverse crack at right

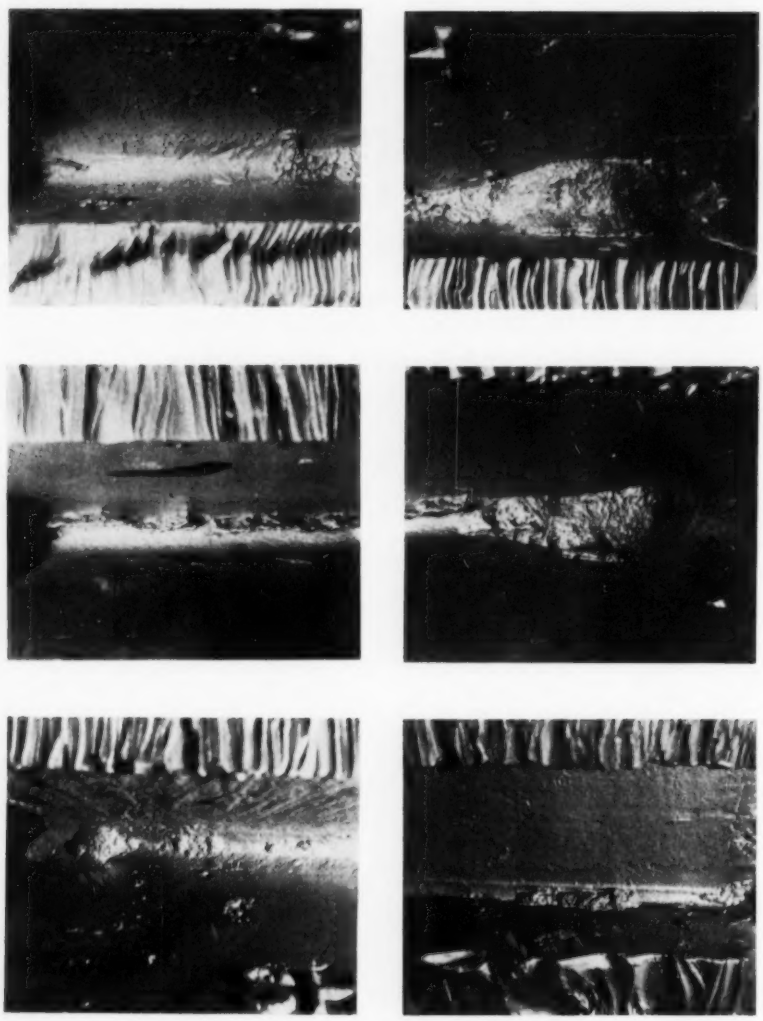


Fig. 5—Top (left) and bottom (right) views of keel block edge for different sand compositions. Top—silver sand and chamotte. Center—silver sand and zircon sand. Bottom—chamotte and zircon sand

were made with the George Fischer ramming apparatus so that the results were repetitive. The triangular form of the cores was selected to test corner or edge strength.

In addition, heavy-walled rings 520 mm OD and 275 mm high were poured around cores of various diameters. An example of the diversified configurations of the bores in the perforated disc is shown in Fig. 4. The left core shows a longitudinal crack while a transverse crack appears in the right core.

Mixtures—Materials used were quartz sand of 60 AFS fineness, chamotte, zircon sand of 90 AFS fineness, chrome-magnesite, and sodium silicate binder with 2.5 ratio and 10 per cent sugar content. The accompanying table shows the mixtures and casting behavior. Since reactions between the quartz sand and the sodium silicate binder were assumed to be causes of deformation and penetration, their correction was investigated through a range of mixtures.

Experiments to restrain reactions by coating the quartz grains with graphite or clay (Mixes 2 and 4) failed in spite of various mixing techniques. Also, Mix 3 with borax addition gave no result apart from premature hardening of the mixture. Neutralization of borax with sulfite or caustic soda did not hinder that. Since an influence of grain shape was presumed, broken ground silica brick was tried (Mix 5) but deformation also occurred. The deformation and its consequences could be eliminated merely by the

addition of a considerable quantity of iron oxide (Mix 9) which will be explained later.

Cores of pure chamotte (Mix 6) showed no deformation. The casting surface was fairly rough due to the coarse grains. A mixture of 50 parts quartz and 50 parts chamotte (Mix 10) behaved very favorably. With heavy castings, up to 20 parts quartz sand and 80 parts chamotte (Mix 11) was employed successfully as it is in the production of heavy-walled cast steel castings. Explanation of this behavior will require further investigation.

Pure zircon sand (Mix 7) showed no deformation. The cast surface was smooth. However, the sand is very expensive. Experiments to substitute partially quartz sand (Mix 8) were disappointing.

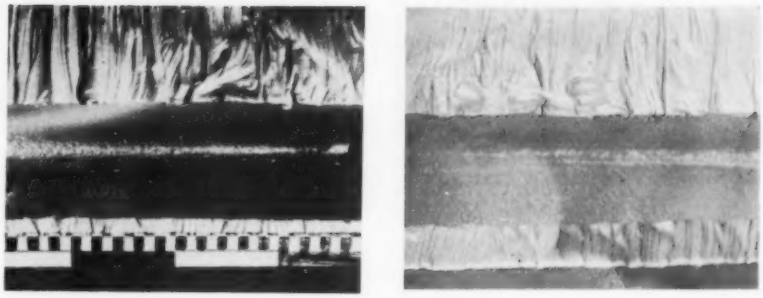


Fig. 6—Chrome-magnesite mixture (top section at left, bottom at right)

Strangely, the faulty conditions partly were greater than with pure quartz of Mix 1. Mixtures of ground, used chrome-magnesite bricks (Mixes 12 and 13) have very favorable behavior and the bricks are comparatively cheap since they accumulate in every steel plant. Also, faulty conditions do not arise in pronouncedly massive castings so that a material with excellent future for heavy steel castings might be produced.

Fig. 5 shows the edge on the

Investigation of CO_2-Hardened Molding Materials

No.	Mixture	Behavior of the Mixture	Behavior of the Core in Perforated Disk after Fig. 6	Behavior of the Core in the Keel Block after Fig. 5	
1	100 quartz sand 5 water glass	Good plasticity; limited refractoriness	In middle part (zone of greatest heat sink) penetration, fissure formation, swelling deformation	On 30° angle, strong penetration on lower half, transverse and longitudinal fissures through core in steel; many times above the fissures changes to blow pits; deformed surface	In thick walled ring behavior as in perforated disk.
2	100 quartz sand 6 water glass ½ iron oxide 2 blue clay	Owing to higher fine particles, rapid setting; flowability decreased	As in Mixture 1; corner strength of the triangular cores was poor as in 1	As in mixture 1	
3	100 quartz sand 6 water glass ½ borax	Premature hardening of water glass by borax; difficult workability; flowability very limited	Swelling deformation; penetration less than 1; corner and abrasion properties very poor	Deformation, penetration less than 1; large pores in core (workability difficulties) cause sporadical roughness; poorer core disintegration.	
4	100 quartz sand 2 leaf graphite 5 water glass	Good plasticity; rapid setting	Very strong penetration, swelling deformation	Corners strongly penetrated	
5	100 ground silica brick 4 water 8 water glass	Poor workability, loose and crumbly; flowability very limited	Corner strength very limited, resulting in strong erosion; penetration and deformation	Corners strongly eroded	
6	100 fine chamotte 4 water 8 water glass	Limited flowability	Not penetrated, rough owing to large pores, not deformed	Corners owing to large grain size sporadically unclean, otherwise clean.	
7	100 zircon sand 8 water glass	Very plastic, high flowability; owing to fine grain size setting more rapid than mixture 1	Very smooth, not deformed; very hard, and thereby poor cleaning	Solid corners, poor cleaning	
8	50 zircon sand 50 quartz sand 4 water glass	Good plasticity; good flow capabilities	As in 7	On the 30° corner, deep core cracks in which steel entered, leading to penetration	
9	100 quartz sand 12 iron oxide 8 water glass	Plastic, good workability	Very abrasion resistant; very smooth; not deformed; core hard sintered, poor cleaning; peeling		In thick walled rings, behavior as in perforated disks
10	50 quartz sand 50 chamotte 2 water 6½ water glass	Little plasticity; better flowability than Mixture 6	Not penetrated, not deformed; roughness less than Mixture 6	Corners lightly penetrated	
11	80 chamotte 20 quartz sand 2 water 7 water glass	Similar to Mixture 10	As in Mixture 6, in practical operation good surface smoothness and requisite accurate dimensioning	Corners clean, but due to coarse grain size sporadically rough	
12	100 chrome magnesite 5 water 10 water glass	Plastic, corner firmness	Very smooth, not deformed	Corners, due to coarse grain size, sporadically unclean; elsewhere very smooth.	Very clean surface
13	100 chrome magnesite 10 water 10 water glass	Plastic, very hard and corner firmness according to hardness	Very smooth, not deformed	As in 12	As in 12

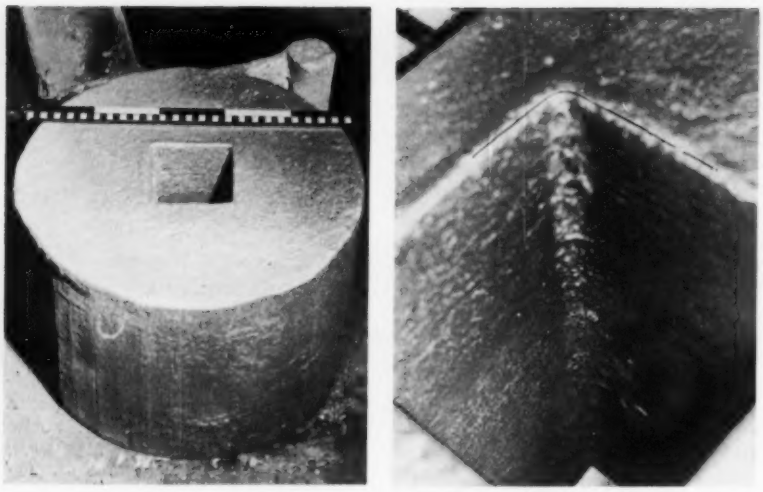


Fig. 7—Heavy-walled castings with chrome-magnesite cores

acute angle of the keel block with the silver sand-chamotte mixture No. 10. The burn-ins are considerable on the lower parts of the block and confirm the practical knowledge that the hydrostatic pressure of fluid steel has an influence on the penetration of metal into the sand.

Fig. 5 also shows the same edge with silver sand-zircon sand mixture (Mix 8). It also reveals considerable burn-in so that this mixture is not recommended for heavy wall thicknesses. An improvement relative to penetration proved to be a chamotte-zircon sand. The edge exhibits no burn-in.

Favorable results against burn-in were produced, as already mentioned, by a mixture of ground chrome-magnesite brick which is available from dismantled Siemens Martin furnaces (Fig. 6). It shows no penetration at the corner and, in addition, the casting surface is smooth and clean.

Fig. 7 shows the inner surface of a heavy cast steel block in which the core was made from a silicate-bonded chrome - magnesite mix hardened with carbon dioxide. The surface is completely smooth and even to the edge no burn-in was observed.

Dilatometer Curves—To clarify the question of penetration and deformation of cores, various sand mixtures were subjected to dilatometric investigations.

Fig. 8 shows dilatometric curves for all the quartz sand mixtures. All curves show a slow but steady expansion up to around 600° C; then in the region of the quartz transformation at 573° C they suddenly show an abrupt arrest point. Within a small temperature interval the expansion reverses and a considerable contraction occurs.

For example, the ground silica brick shows a contraction of 2.3 per cent between 600 and 700° C following an expansion of 1 per cent up to these temperatures. In other words, within a temperature range of 100° C a change in volume of almost 3.5 per cent occurs through contraction. Considering the established changes in quartz sand cores, the barrel-shaped swelling condition might occur up to a temperature of 600° C whereas on crossing this temperature zone cracks appear which lead to penetration and burn-in on the sand surface.

It is further evident that certain additions influence the sudden transformations of expansion to contraction—that is, by delay so that the transformation temperature zone will be expanded substantially. For example, an addition of about 10 per cent iron oxide results in an increase of nearly 400° C in the transformation zone. Iron oxide additions in silicate-bonded quartz sand cores prevented occurrence of barrel-shaped deformation

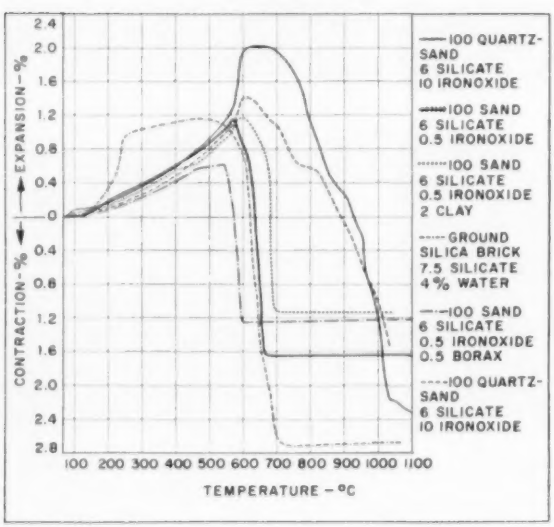
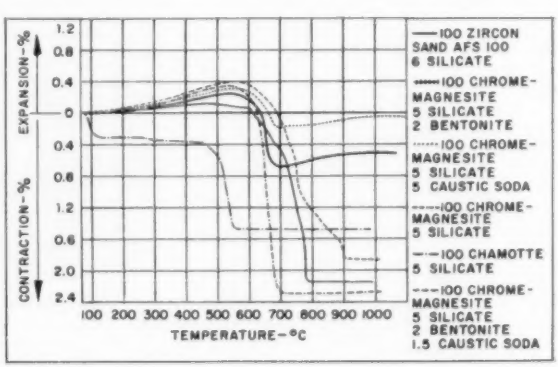


Fig. 8—Dilatometric curves of quartz sand mixtures

Fig. 9—Curves of various other molding materials



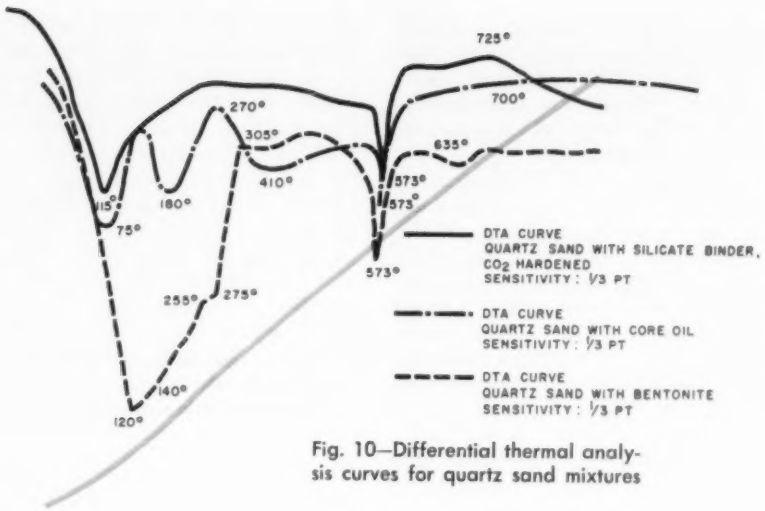


Fig. 10—Differential thermal analysis curves for quartz sand mixtures

Fig. 12—Zone formations with quartz sand cores in steel

and crack formation owing to the slow change in core volume.

Addition of borax to silicate-bonded quartz sand hardened with carbon dioxide also operated favorably on deformation and penetrations of the core, although borax additions did not completely hinder those conditions.

In contrast to quartz sand mixtures, the dilatometric curves of zircon or chrome magnesite (Fig. 9) show a relatively insignificant expansion up to a temperature of 600° C and then on crossing this temperature exhibit a contraction in various magnitudes. While with zircon sand a slow but extended contraction up to a temperature of 200° C is observed, chrome magnesite mold material shows an almost ideal behavior. Nevertheless, the contraction of this material through addition of some soda lye or bentonite is only about 0.5 per cent. On this basis, neither deformation nor any changes which can cause cracks will arise with some cores.

Differential Tests—The question of what reactions take place through heating of the mold material during casting cannot be clarified conclusively through dilatometric investigations. Hence, molding mixtures of quartz and zircon sands were subjected to differential thermal analysis.

Fig. 10 shows results for quartz sand mixtures with additions of core oil, bentonite, and silicate-bonded, carbon dioxide-hardened mixtures. Characteristic of all three curves is a sharp endothermic minimum of 573° C which, without doubt, is associated with the considerable volume increase concomitant with the transition of alpha to beta quartz.

The endothermic minimum appearing at 115° C with silicate-bonded sand can be traced back to the loss of a relatively large quantity of contained water of absorption in carbon dioxide sand. The small maximum at 325° C and 490° C are dependent on the change in specific heat which is observed with heat of gelation—especially with silicic acid gelation.

The small maximum at 725° C can be traced back to the beginning of the formation of sodium silicate which usually sets in with the presence of trace water at high temperature. The sharp decrease of the curve above 725° C might be caused by the setting in of carbon dioxide dissociation.

With oil-bonded sands, a maximum occurs at 270° C next to the strong endothermic minimum at 575° C which probably can be attributed to the burning of the core oil. Of interest in this curve is

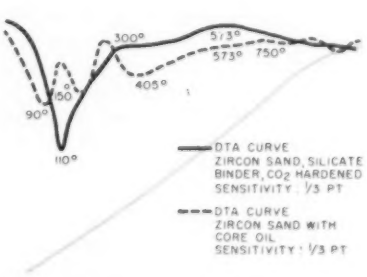


Fig. 11—Thermal analysis curves for two zircon sand mixtures

the completely symmetrical course beyond 700° C which permits the conclusion that no transformation occurs above this temperature in the quartz sand mixed with oil.

Bentonite - bonded quartz sand likewise shows the endothermic minimum at 575° C, and at 120° C an endothermic minimum due to loss of water. Reactions at 140, 255 and 275° C are traced back to slight impurities in the sand mixtures. However, no further transformations occur above 700° C with quartz sand mixtures.

Zircon sand mixtures, Fig. 11, differ substantially from quartz sand mixtures in the trend of the differential thermoanalysis curves. The small endothermic minimum at 573° C is concluded to be due to a slight amount of quartz in the zircon sand. With silicate-bonded sand, the absorption water appears similarly again at 110° C. Above 750° C the slow decrease of the curve signifies the dissociation of the carbonate through addition of carbon dioxide.

Trend of the curve for zircon sand with core oil shows a certain similarity to the quartz sand mixture. The endothermic minimum at 573° C is indication of only a slight trace of quartz in the zircon sand.

Mineralogical Investigations—By thorough investigation of the burn-in of silicate-bonded quartz sand on heavy cast steel pieces, several zones of different composition can be identified (Fig. 12). Zone *A* lying directly on the casting shows a considerable iron oxide film; the

iron oxide content is between 14 and 16 per cent. Zone *B* exhibits a slight content of iron oxide. Yet here, as in zone *A*, a fusion of the binder has occurred. The further zone shows only slight changes in original texture.

Fig. 13 shows clearly the penetration of iron oxide into the interior of the core where, as already mentioned, the amount of iron oxide from outside to inside decreases. The micrograph reproduces the particular cross section of the structure near the interior.

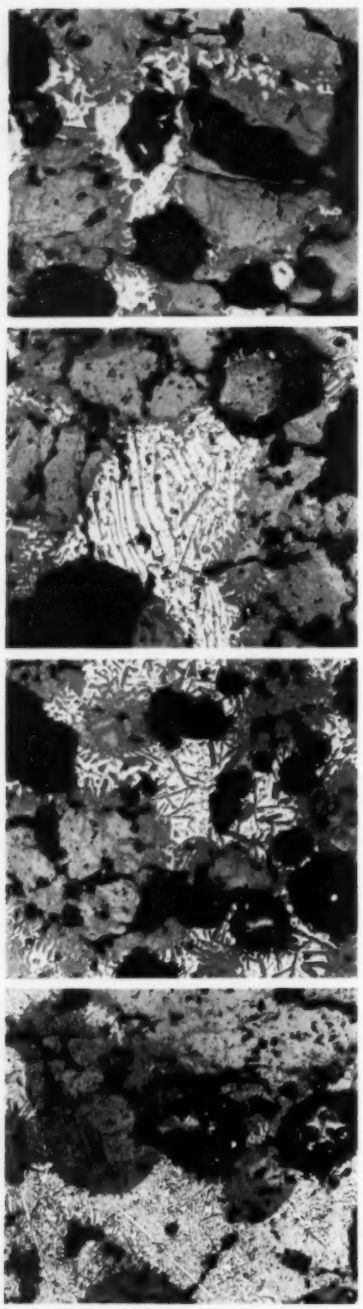


Fig. 13—Structure of Zone A in Fig. 12. Top to bottom depict outer to inner edge. X100

The top part of the illustration, taken at the outer wall of the core, shows heavy crystallization of the quartz grain surface. The white portion might represent an iron oxide-sodium oxide silicate phase which was activated by crystallization. Near the middle a eutectoid and sporadically a lamellar structure is found. The iron oxide-sodium oxide silicate phase shows slight crystallization. In the inside are portions of primary crystallization of a fine eutectoid structure.

In summary, the results of the investigation again clearly confirm that quartz sand in no manner is to be considered the ideal molding material for the carbon dioxide process for production of heavy-walled castings.

Heated Carbon Dioxide—In practice at least 1 kg of carbon dioxide per 100 kg of mold material is used, but that value can be exceeded considerably. Since so far there has not been any substantial decrease in price, ways and means to reach economical production with the carbon dioxide process must be sought to minimize costs.

Through a series of investigations[1] it was established that the carbon dioxide process consists of several chemical and physical reactions. One of these is the evaporation of water and the other the reaction of carbon dioxide with sodium silicate forming silica gel. All researchers discovered consistently that cores which stand in air without treatment with carbon dioxide increase in strength. This led to the conjecture that the increase in strength is due to evaporation of water in the core. To prove this experimentally, a hydrometer was built into the gas duct in a series of tests, and it actually was ascertained that after a certain gassing period moisture increased in the exit gas stream.

Fig. 14 plots injection time and the relative moisture in the exit gas. After injection of carbon dioxide for 2 minutes at room temperature, maximum relative moisture of 85 per cent was reached. After about

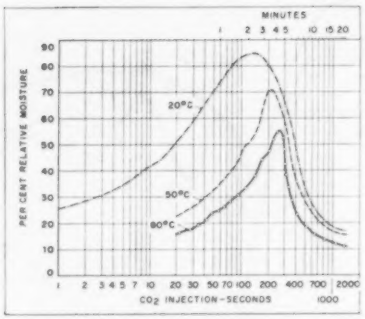


Fig. 14—Influence of temperature and injection time on relative moisture in exit gas

23 minutes the relative moisture again reached the starting value. With carbon dioxide at temperatures of 50° and 80° C, similar curves were obtained but, owing to the higher temperatures, the relative moistures were only 70 and 50 per cent, respectively. Also, at those temperatures the starting values of relative moisture again were reached in 25 minutes. This proves clearly that in the CO_2 process an evaporation process also occurs in addition to pure reaction between sodium silicate and carbon dioxide.

Since treatment with carbon dioxide not only develops a reaction between sodium silicate and carbon dioxide, but also brings about evaporation of water, it is obvious that introducing the carbon dioxide at elevated temperature accelerates water evaporation and chemical reaction.

For clarification, a special heating device was developed for an extensive series of experiments. The vessel was equipped with two manometers and an inner heating coil. In the first investigations the heating coil was flushed with oil. Later with new equipment, distilled water was used to eliminate incrustation of the oil.

Carbon dioxide from the flask (Fig. 15) was conducted through the heating coil to the pressure reducing valve and to the air tank. The air tank must be incorporated to hold the carbon dioxide temperature constant during the test period. Carbon dioxide from the air tank passes through a flexible tube to a dosimeter gun or pistol and into the test piece. Temperatures were determined with an electric thermometer.

Exact stoppage of injection time is especially important for definite

results; instead of the previously used time relay a gun was developed which controls the flow of carbon dioxide without use of electric or magnetic devices.

Through pressure of an activating lever on this dosimeter gun or pistol a piston is displaced according to a scale setting, and carbon dioxide is delivered through the exit opening. The supply again is shut off according to the predetermined time setting through the control piston. The pistol makes it possible to fix the flow period of carbon dioxide accurately and to end it automatically so that no electric or other mechanism is required.

Fig. 16 shows the influence of temperature of carbon dioxide on the properties of silicate-bonded sands. Test specimens were made in a George Fischer device using three rams. First is a strength decrease at all temperatures, the longer the treatment with carbon dioxide. Through increase of the temperature a considerable increase in strength occurs with similar injection times.

For example, with injection for 7 seconds at 17° C the shear strength was 2000 g/cm². If the carbon dioxide is heated to 35° C the strength increases to 2800 g/cm² for the same injection period or 40 per cent higher than at room temperature. Shear strength at temperatures of 50° to 80° C is within the scope of that at 35° C so from an economic viewpoint carbon dioxide should not be heated over 40° C.

This evidence doubtless has special significance for further growth of the method. In repetitive production, injection time of carbon dioxide affects the time of all other processes such as opening coreboxes and extracting cores. Through use of a preheater it should be possible to accelerate the method still further and thereby decrease considerably the amount of CO_2.

Heating of carbon dioxide not only has great importance for repetitive production through automatic control of the separate processes but it also probably is of benefit for particular production. Similarly, with use of the dosimeter gun with the preheating unit, each injection period is decreased and carbon dioxide can be saved thereby.

In a series of investigations published recently it was pointed out that through use of air or an air-carbon dioxide mixture a hardening of silicate bonding is possible. Fig. 17 shows results of the use of a mixture of about two-thirds carbon dioxide and one-third air compared with pure carbon dioxide at a temperature of 35° C. It shows that longer gassing time is required with mixtures to attain the same strength as with pure gas. As indicated, a shear strength of 2800 g/cm² was obtained after 6 seconds with pure carbon dioxide, but nearly 12 seconds was required for the same strength with mixed gases. While with the mixed gas one-third of the carbon dioxide was saved, the doubled gassing time clearly indicates that economical production with regard to rapid operation is not warranted with air-carbon dioxide mixtures.

To summarize, it may be said that use of pure carbon dioxide heated to a temperature of 35° C (95° F) will prove to be the most economical method of gassing in the carbon dioxide process.

In conclusion, the author thanks his co-workers Ing. R. Wlodawer and K. Nickel for assistance in carrying out the experiments.

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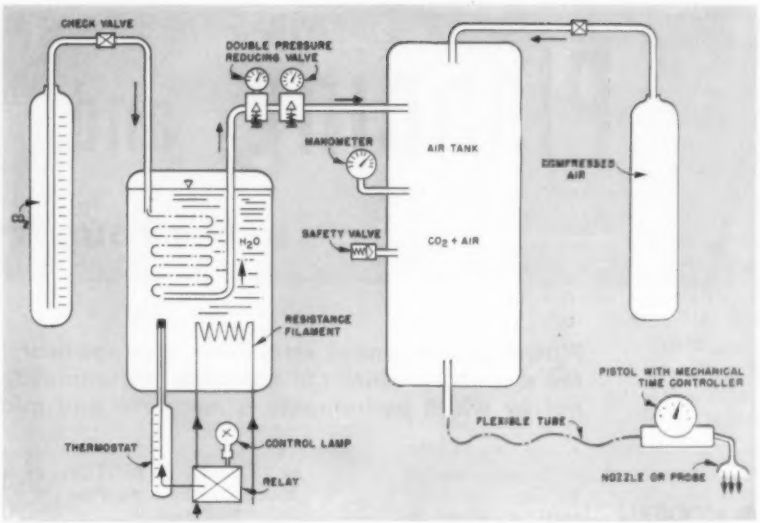

Fig. 15—Diagrammatic sketch of CO_2 heating and air mixing equipment

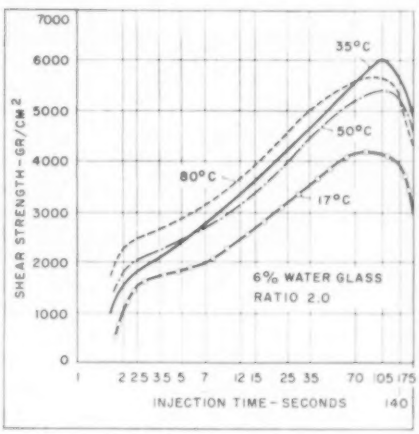

Fig. 16—Relationship of shear strength to CO_2 temperature

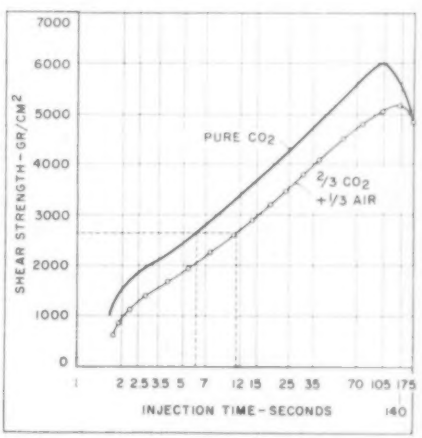

Fig. 17—How addition of air affects strength at 35°C

Planning and Control in the Foundry

Planning and control establishes management objectives, outlines the means by which the objectives are attained, and provides control by which performance is measured and mistakes are corrected

By DONALD E. BRITTON
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Northbrook, Ill.

● MODERN business management, like baseball, is a game of statistics. In the "good old days" a tough, hard-headed foundryman earned his profits by the sweat he dripped into the molds he made, and by the practical know-how he put into the melting of the metal he poured.

He had closely guarded secrets—tricks of the trade—to which he added brawn and guts that earned him the respect and loyalty of his customers. He had a good spread between his costs and his selling price, and his profits were not eaten away by gnawing governmental control and taxation.

Today's business operations still need the hard work and know-how of old, just as baseball needs the clutch hit and the game-saving double play, but statistics guide the manager through the delicate pressures of the game where wrong decisions can mean defeat. Business profits are slim at best, and survival depends on the businessman's ability to take advantage of every tool, every break, every warning sign that the science of management has been able to develop.

Almost all of these tools and warning signs are expressed in terms of statistics and percentages, as in the game of baseball. In manufacturing operations these statistics and percentages take the form of cash forecasts, operating statements, comparative balance sheets, standards, performance measurements, job-cost records, quality controls, cost controls, break-even points, fixed asset limits, financial ratios, operations research, communications, and planning.

These are management terms. They are not bewildering theories concocted by bookish economists. They are not accounting procedures whose principal function is to enable the company to file an income tax return. And they are not the exclusive properties of big business. They are practical procedures for getting things done right. When once the foundryman has learned about these tools of management, he will find them as friendly as the game of baseball and as simple to understand as a batting average.

Many prominent business leaders feel very strongly that the most effective tools for building profits and earning a fair return on invested capital is a system of business management called planning and control. Planning and control (P & C) establishes objectives, outlines the means by which these objectives are achieved through intermediate stages of progress, co-ordinates the efforts of all departments, and provides the control by which performance is measured and deficiencies are brought to light and corrected. P & C, in short, develops a continuous, workable, realistic plan for the sustained success of the company.

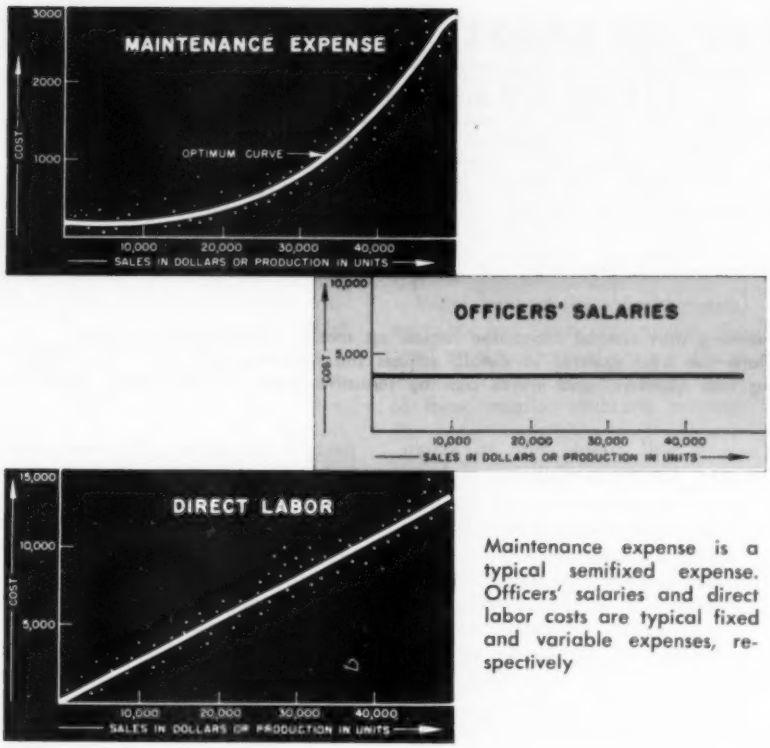
It is very alarming to find so few foundrymen using such a plan to control their operations. Without planning, a company is much like a rudderless ship sailing aimlessly about on a treacherous sea entirely at the mercy of capricious winds and currents. Or, to be metaphorically modern, it is like a poopless rocket in outer space unable to extricate itself from the countless forces of relativity. Planned progress is the company's poop. Without it the business runs the management, not the management the business.

Whether the management team consists of one man, the boss, wearing ten different hats, or ten trained specialists in various phases of the science of management, planning and control is essential to complete success.

About the Plan—The "planning" part of a P & C program sets out events that should take place at specified times or during designated periods which will bring about the desired amount of earnings to satisfy the objectives of the company. The "control" part of this program compares the actual events as they take place with the plan, determines how well the plan is being fulfilled, and exposes the deficiencies which threaten achievement.

The plan must be realistic, for, if it is not, its effectiveness is very quickly reduced, and the faith the members of the management team have in it seriously undermined. On the other hand, a plan realistically conceived and successfully executed is a great morale builder and makes of business operation the fascinating game that it should be.

Setting the Objectives—Under a system of free enterprise, earnings on investment are essential to the continuous operation of any enterprise. The objective of any company, therefore, is fair earnings on invested capital. Record production is not the real goal. Peak sales volume is not the real goal.



Maintenance expense is a typical semifixed expense. Officers' salaries and direct labor costs are typical fixed and variable expenses, respectively

Bigger profit is not even the real goal.

Fair earnings on invested capital implies a profit large enough to provide cash for risk capital dividends plus sufficient funds retained by the company for reasonable growth and expansion. Faced with this concept, then, the initial step toward planning and control is to determine the net amount of capital invested in the enterprise. This amount is made up from two sources: Ownership capital and borrowed capital. Ownership capital is the tangible net worth of the business today, not the original investment, or the sum of the monies paid into the capital account since the start of the enterprise, for this sum may have been increased by profits or diminished by losses.

To this tangible net worth is added the total amount of money borrowed at fixed rates of interest under long-term arrangements to arrive at a figure representing the total capital investment on which a fair amount of earnings should be made. Borrowed capital, or debt capital, is included in the "total capital invested" figure because earnings in excess of the interest paid for this borrowed capital are anticipated; otherwise there would be no point in borrowing such capital.

Planning starts at this point. A good foundry operation earns better than 12 per cent after taxes on total capital invested. If this capital is 60 per cent ownership capital and 40 per cent debt capital—an ideal balance in most cases—this foundry will earn about 14 per cent on its ownership capital and about 10 per cent on its borrowed capital after its tax deductible interest is paid to the lending institution. With these standards as a guide, any foundryman can compute the standard fair earnings on total capital invested to which his operation is entitled. This figure, then, is the objective—not sales volume, not production efficiency, not even profits as such, but earnings on capital invested—the take home pay of the investor and entrepreneur.

When this figure has been determined, it is prudent to caution the foundryman once again to be realistic. This figure must stand. It must remain the over-all objective. And it must be attained. But the practical aspects of the foundry business—and particularly the foundry's own past experience—must be considered in determining the length of time that will be required before this goal can be achieved repeatedly from one fiscal period to the next.

If the individual foundry's experience has been more bad than good, more losses than profits, P & C plus hard work will correct such a situation (hard work alone rarely does) but not overnight. It may take five years. If the foundry's experience is fairly good, P & C can take hold quickly and the objective can be set and attained each quarterly fiscal period within a year's time. For the poorer operation, however, intermediate stages of achievement must be planned; perhaps one-fifth of the recovery toward fair earnings, the real objective, can be set for each succeeding year over a five-year period.

Getting Organized—Now the objective is established. The next step is organization. This is easy. Some organization exists already in any company. Well run operations are fully organized. But teamwork is essential in any P & C program, so, however much organization may already exist, it should be subjected to careful review.

Briefly, the work of organization may proceed somewhat along these lines: Departmentalize the operation. Create new departments if none exist wherever work is performed. Put one individual in charge of each department. Give him complete charge, fully responsible and accountable for its work. For instance, the office is a department. Give it a manager. The lab is a department whether it consists of a part-time sand technician or a complete metallurgical and product research section manned by a dozen engineers. Put someone in charge of its efforts toward playing its part in the organization. One individual can have two or more areas of responsibility, but two individuals should never share one responsibility.

An organization chart is helpful. Such a chart does not, in itself, guarantee the existence of a strong management team, but it will enable the chief executive to see the various functions of management in his own operation more clearly,

MASTER CONTROL SHEET

	FIRST QUARTER YEAR 1958											
	JANUARY			FEBRUARY			MARCH			PLAN 2nd QTR.	PLAN 3rd QTR.	PLAN 4th QTR.
	PLAN	ACTUAL	OVER UNDER	PLAN	ACTUAL	OVER UNDER	PLAN	ACTUAL	OVER UNDER			
P&L STATEMENT												
Sales												
Total Manufacturing Cost												
Gross Profit												
Selling & Advertising Expense												
General & Administrative Expense												
Net Profit												
Miscellaneous Income												
Net Profit Before Taxes												
Earnings on Investment (70% of Net) (Depending on Bracket)												
MFG. EXPENSES												
Direct Labor												
Direct Materials												
Supervision												
Indirect Labor												
Maintenance Labor												
Maintenance Supplies & Parts												
Additives												
Abrasives												
Miscellaneous Supplies												
Sand—Molding												
Sand—Core												
Binders												
Cut-off Saws and Wheels												
Small Tools												
Fuel—Heating												
Fuel—Melting												
Water												
Power & Light												
Rent												
Freight												
Crucible Expense												
Truck Expense												
Depreciation Expense												
Insurance Expense												
Payroll Taxes												
TOTAL MANUFACTURING EXPENSE												
SELLING & ADV. EXP.												
Advertising												
Convention Expense												
Dues												
Salesmen's Salaries												
Commissions												
Travel Expense												
Customer Entertainment												
Auto Expense—Sales												
TOTAL SELLING AND ADV. EXP.												
GEN. & ADM. EXPENSE												
Officers' Salaries												
Office Salaries												
Professional Fees												
Taxes												
Insurance												
Depreciation												
Telephone & Telegraph												
Postage												
Office Supplies												
Publications												
Auto Expense—General												
Donations												
Rent												
Utility Expense												
Sundry General Expenses												
Office Payroll Taxes												
TOTAL GENERAL & ADM. EXP.												
CASH FLOW												
Cash on Hand												
From Operations												
From Loans												
From Other Sources												
Total												
Loans Paid												
Other Disbursements												
Total												
Net Cash Remaining												
Minimum Bank Balance Required												
Excess Cash												
APPROPRIATIONS												
Machinery												
Buildings												
Investments												
Dividends												
Other Projects												
TOTAL CASH DRAWN FROM W. C.												
TOTAL SALES												
TOTAL EXPENSE												
NET PROFIT												
FIXED EXPENSE												
VARIABLE EXPENSE												
BREAK EVEN POINT												

Planning and control committee makes up master control sheet quarterly. It plans the next quarter in detail, adjusts the tentative plans for the following two quarters, and works out the tentative plans for the fourth quarter

and it will enable him to assign duties, fix responsibilities, and require performance toward planned objectives with much greater finesse.

Draw up an organization chart. Include everyone on this chart who is above the working force: Assistant foremen, foremen, superintendents, managers, clerks, secretaries, accountants, consulting staff, officers, board members, board chairman, stockholders. Put each one someplace. Arrange them in accordance with the departmentalization. Check the seniority ranking. Arrange those individuals who are considered senior to others above others on the chart. This fixes lines of authority and communication channels—lets everyone know where he stands.

It is now time to advise all of the department heads and section managers that they have been assigned a specific function within the organization, and that each one's duties, responsibilities, and extent of authority will be clearly outlined under a new administrative procedure called planning and control. They are further to be advised that each one has an important part to play in assuring the success of this new plan and will be held accountable for the results of his efforts in his area of responsibility; also that he will *participate actively in the management of the business and share materially in its successes.*

The next part of the work of organization is to work out with each individual his area of responsibility within his assigned function, name his duties, grant him authority within specified limits, and *charge* him with the responsibility for the successful operation of his part of the plan. Be brief, keep it simple, but write it out. Adjustments and refinements can be made as experience in the operation of the plan and the new organization is acquired.

Now the management team is organized. Every individual has a specific responsibility, and every conceivable function of the company has been placed in charge of a specific individual. There is no overlapping of authority, and there are no gaps. The top executives of the company have met with the members of the management team both individually and collectively, and they have drawn up a chart graphically illustrating the departmental arrangement, the proper lines of communications and authority, and the organization of personnel right down to the working force. The entire management team has collaborated on a manual of operations which briefly outlines the duties, responsibilities, and extent of authority of all.

Conceiving the Plan—The third step creates the plan and creates the mechanics for the *continuation of planning.*

A planning and control committee is appointed. This group can consist of any reasonable number of individuals from the management team and even from the board of directors or outside consultants (lawyers, accountants, professional management men).

Incidentally, and this is an important digression, thousands and thousands of companies have boards of directors, yet fewer than 10 per cent of these boards function at all or even meet periodically to discuss the affairs of the company for which they are supposedly

responsible. A board that does not function should be replaced.

Every business community has many able businessmen who are happy to serve on active boards for very nominal fees and who can contribute priceless quantities of advice and assistance not only in planning, but in sales leads and ideas, financial backing, engineering talent, and plain old encouragement when things get tough. Activate the board of directors. The members need not be stockholders, necessarily. And, with respect to partnerships and proprietorships, there is no reason why similar boards cannot be organized, functioning very much like corporate boards.

The planning and control committee usually consists of one board member or outside consultant representing the board, the chief financial executive or his direct representative (the accountant in smaller operations), the sales manager, the production chief, the executive vice president or the chief executive himself, in the smaller company, if he so desires. In any event, this group *must have power and it must have prestige.*

The P & C committee meets once each week. Its first task, however, is to create an operating plan that will achieve the first step in the direction of the main objective, and guide and control the operations of the foundry during the ensuing three months. This task will entail establishing the volume of business which will be required during each of the next three months which will produce a profit adequate to meet the desired earnings objective for the quarter. Having established this sales volume and projected profit result, the total maximum expense allowable is easily computed through the process of accounting arithmetic.

This procedure is significant in a planning and control program. The approach is the reverse of the usual formula, sales minus expense equals profit. P & C contends that predicted sales minus desired profit equals *maximum expense allowable.*

This figure, the maximum expense allowable, represents the amount of cash that can be disbursed, or accrued charges that can be incurred, or deferred charges that can be absorbed by everyone in the organization in achieving the sales which will produce the profit which will provide the earnings that will satisfy the objective. The hard part of planning is to distribute this amount of cash and charges equitably throughout the various departments in the organization so that the necessary work can be performed.

When each of these departmental amounts has been determined, the total must not exceed the maximum expense allowable. In effect, each of these smaller amounts becomes the objective within each department. It becomes the responsibility of each individual in charge of an operating or service function of the business not to exceed his allotted share of the maximum expense allowable. There is nothing really new and different about this procedure, of course, in itself, but it does play an important part in the entire program.

But, exactly how much can the sales department spend? How much can the coreroom spend? How much can the maintenance department spend?

Although setting these limiting amounts equitably and realistically is no cinch, it is far from impossible, and need never be a matter of guesstimates. And certainly this determination should never be a matter of "I'll let you know after I've spent it," yet this is precisely the way in which most operations are (mis-)managed.

Detailing the Plan — Benjamin Franklin said, "I know of no basis on which to predict the events of the future other than by studying the events of the past." This is the basis on which planning and control is formulated.

A very close relationship exists between the number of production units manufactured and sold every year, every month, every week and each and every type of expense incurred during the corresponding year, month, week. For instance, by comparing the direct labor hours each month over a period of the last five years of operational history with the sales volume each month, a fairly accurate *standard direct labor charge per sales unit* can be determined.

This standard must not be the average of all of the months but should be pegged at or near the most efficient production period the company experienced. The theory, of course, is that if the company can operate at this peak of efficiency one month, it should be able to operate at this peak every month —with controls—and even improve on it. The best period of operation from the standpoint of efficient production is the best score, par for the course.

The first tough job the P & C committee must tackle, then, is the analysis of the company's operations during the last five years in order to set a *standard* for every type of expense incurred. (This determination may be worked out on the basis of dollars of sales compared to each type of expense incurred if records do not readily show hours and production units, but adjustments may be necessary to compensate for price and labor cost fluctuations.)

Regardless of the method used, the job at hand is to produce from an analysis of the company's past performance a set of charts or tables that will reveal what each and every type of expense *ought to be* at any level of production and to develop formulas which will distribute these expenses equitably throughout each department.

This job would not be difficult if all expenses had the same characteristics as direct labor—that is, if all expenses increased or decreased directly with or in proportion to production units manufactured and sold, and if the entire amount of the expense was incurred in just one department.

Expenses like direct labor are called *variable expenses.* Their opposite numbers are called *fixed expenses.* Fixed expenses do not vary at all as production increases or decreases (within reasonable limits, of course). Depreciation expense, real estate tax, officers' salaries, and the like are fixed expenses. Consequently, setting standards for fixed expenses is no more of a problem than setting standards for variable expenses. The latter vary directly as does production and the former do not vary at all. The equitable distribution for each of these two types of expense among the various departments will be formulated on the basis of (1) past experience, (2) judgment, and (3) trial and

error as the plan proceeds.

But a classification of expense known as *semifixed* expense has the characteristics of both fixed and variable expense. The P & C committee can determine the standard for any type of semifixed expense at any level of production (or sales) most effectively by plotting the historical data on a chart.

For instance, maintenance expense is a semifixed expense. Even if the plant is shut down, some maintenance work is necessary. But as production increases, maintenance activity increases, although not necessarily in direct proportion thereto. By plotting maintenance costs each month for the last five years against production units, a pattern takes shape on the chart with the plotted points forming a rough path out to the right and sharply up as production increases. An optimum curve drawn through these plots becomes a line of points representing the standard for maintenance expense from a low volume of production to a high volume.

A similar plot for every type of semifixed expense will enable the P & C committee to set standards for these expenses at any production level. Distribution formulas are arrived at in the same manner used for fixed expenses and variable expenses.

A set of charts and distribution formulas for every expense the foundry incurs during its operations at any production level enables the planning and control committee to determine what the foundry's expenses in every department *should be* for any sales volume it may predict for the ensuing quarter. Of course, adjustments for current conditions and unusual production runs are often necessary. As production and sales proceed according to plan, actual expenses as incurred are compared with the standards as adjusted. Out of control items are exposed to the department heads and to the committee, and corrections can be made through whatever means may be appropriate.

This control, of course, is the key to the success of the entire plan. Without standards, which have been set from actual experience and are therefore realistic and attainable, *management has no way of knowing which expenses are out of control eating up the profits.* With standards, excessive expense—waste—is easily and instantly isolated and analyzed. Remedial action is immediate and precise.

Projecting Sales—Sales prediction is always tricky. Pegging the expected sales volume for the ensuing months and quarterly fiscal periods is the job of the sales manager. Constant study of current conditions and trends is necessary. Several approaches to the problem are (1) statistical analysis of past sales records, (2) analysis on the basis of the trend of the national economy, and (3) market research.

A study of the company's historical data reveals seasonal highs and lows, always a contributing factor to monthly fluctuations. Further study, and continuous computation of a moving average, or 12-month float, will reveal a sales trend up or down for the company not beclouded by these seasonal influences. Computing a moving average is very simple arithmetically: Add the total sales for each month for the last 12 months and divide this sum by 12. Plot the result on a chart. Add each new monthly sales volume to the 12-month total and subtract the sales volume for the oldest month. Divide by 12 and plot the result. Seasonal ups and downs are eliminated by this method and an accurate month-to-month trend is obtained.

Studying the company's sales statistics, however, only reveals the trend for the company itself. A study of national economic indexes tempered by local influences establishes the trend for the local foundry industry and the nation as a whole. It is even possible to devise a formula based on several business barometers and tempered with local car loadings, employment figures, and other local influences, whose solution, based on today's figures, is a fairly accurate indication of what the sales level will be for one's own company three months from today.

Comparisons of these two trends—the company's and the nation's as a whole tempered by local conditions—not only indicates the sales volume that may be expected, but also points up *how well the company is holding its own in the industry.*

Market research in the foundry business is a matter of salesmanship and leg work. It is simple to perform, usually very accurate if the optimism of the sales department can be held in check, and has some incidental aspects of no small consequence.

Personal calls on all of the company's customers by the sales manager, plus calls on any immediate prospects, are made quarterly to inquire about each customer's future production plans and immediate requirements. It should be emphasized that this information gathering should not be surreptitious. That is, the customer should be told that a quarterly analysis of sales and trends is being conducted in connection with the company's planning and control program. A careful record is made of all of the information gathered. From this material, and from the continuous analysis of company sales data and national trends, the sales projection is made.

Mentioning the P & C program to the customer in connection with a quarterly market research and discussing with him his casting re-

1957 Total	270,000	÷ 12 = 22,500
1958 Jan.	+ 20,000	
1957 Jan.	− 22,500	
Net	267,500	÷ 12 = 22,230
1958 Feb.	+ 24,000	
1957 Feb.	− 29,000	
Net	262,500	÷ 12 = 21,900
1958 Mar.	+ 25,000	
1957 Mar.	− 37,000	
Net	250,500	÷ 12 = 20,900
1958 Apr.	+ 14,000	
1957 Apr.	− 23,000	
Net	241,500	÷ 12 = 20,100
1958 May	+ 13,500	
1957 May	− 25,500	
Net	229,500	÷ 12 = 19,100
1958 June	+ 12,000	
1957 June	− 16,000	
Net	225,500	÷ 12 = 18,800
1958 July	+ 10,500	
1957 July	− 10,500	
Net	225,500	÷ 12 = 18,800
1958 Aug.	+ 18,000	
1957 Aug.	− 18,000	
Net	225,500	÷ 12 = 18,800
1958 Sept.	+ 16,000	
1957 Sept.	− 24,000	
Net	217,500	÷ 12 = 18,100
1958 Oct.	+ 30,000	
1957 Oct.	− 31,500	
Net	216,000	÷ 12 = 18,000

quirements in the light of this plan very often establishes a co-operative mood that he does not always experience with his other suppliers. The inference is that the foundry is well administered, cost conscious, and quality controlled. And, in a way, the customer commits himself to purchase his future requirements from the sales manager's company and not a competitor. Furthermore, the additional opportunity to contact the customer in this manner is a welcome one. It is not a direct selling effort but accomplishes the same purpose and serves to increase the ratio of face-to-face selling time to total selling effort, a ratio that is chronically too low at best.

Continuing the Plan—The planning and control committee meets once each week with the exception of the senior members who meet with the rest of the committee only once each month. Saturday morning makes an ideal time. The meetings are of three types.

Once each quarter the master planning session hammers out the plan in detail for the ensuing three months, adjusts the tentative plans for the next two quarters, and works out the tentative plan for the quarter following these two. Consequently, planning extends over one full year. A new quarter is added to the master control sheet as each current quarter is completed. This keeps management thinking ahead at least one full year.

Once each month the committee reviews the results of the month just completed, acts to correct deficiencies, and adjusts the plan for the ensuing months.

Once each week the committee receives reports from each department head on items out of control only. This is called management by exception. Only operations not in line with the plan are brought to the attention of the committee. Obviously, this saves time and enables the committee to concentrate its efforts on solving the problems which threaten fulfillment of the plan.

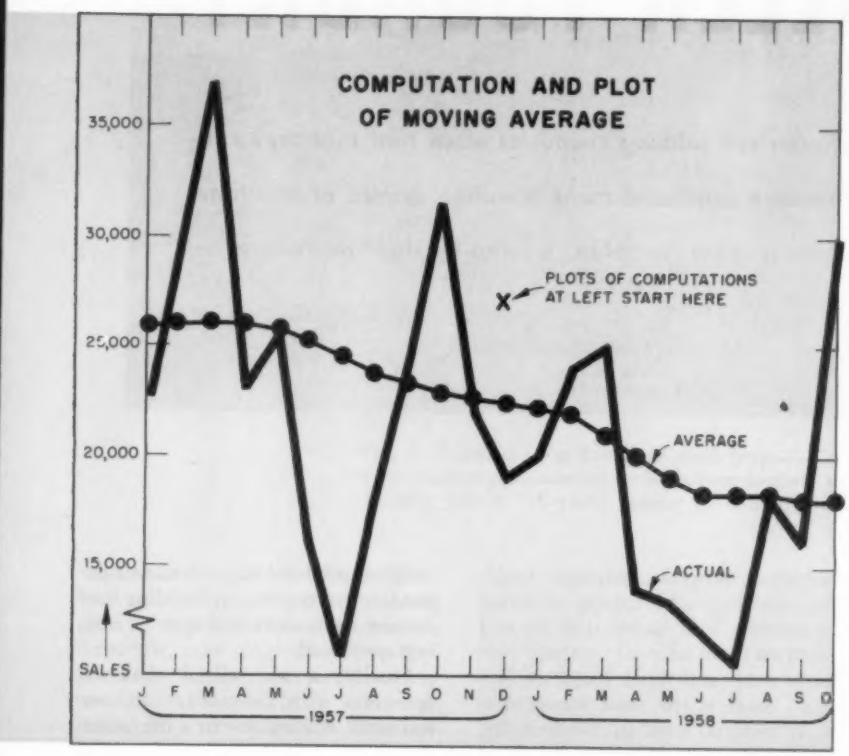


Chart plots moving average of company's sales as computed at left. This statistical analysis of sales is an aid to setting up a projection of sales

Cash Control—Improper control of cash flow ruins thousands of businesses every year. Because of careful planning under the P & C program, the committee can accurately predict the amount of cash that will be required to pay operating expenses for an entire year in advance. Since sales minus operating expenses leave X number of dollars, the committee can intelligently approve or disapprove appropriations for new machinery, plant additions, sales promotion programs, dividends, bonuses, and *plan for such expenditures a year or more in advance.* A shortage of cash through imprudent conversion of working capital into fixed assets, or poorly timed dividend or bonus payments, need never occur to impair the company's financial capacity for optimum production and sales.

Tenth Inning—Persistence, faith, and realism must prevail. Planning and control *never fails to cut costs* although improvement is rarely achieved overnight. And, contrary to the usual opinions expressed about administrative controls, P & C will not materially increase clerical work. In any event, it converts ancient history accounting procedures into an up-to-the-minute management tool. All that it increases is *thinking.*

Yes, P & C puts pressure on the individual to do his job better, and why not? If the company cannot compete, his job will be gone anyway. But the pressure and the discipline is positive, and the co-operation is positive, and the future is positive, and the individual is positive.

So, the shrewd businessman-foundryman must get out the record book and study up on the statistics on eveyone in the league. He must figure out how many games can be won with the available pitchers and work out the batting order. And he must be certain to run a bed-check on the nightly curfew. These measures may be stringent, but, if they are faithfully carried out, the team will make the first division next year.

The boys might even get good enough to beat old Casey.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

HOW TO . . . MECHANIZE the SMALLER FOUNDRY

Small and medium-sized jobbing foundries often find that they cannot afford a complete sand and mold handling system at one time. This article explains how to plan a step-by-step modernization

By HENRY W. ZIMNAWODA
Sales Manager
National Engineering Co. of Canada

● THIS PAPER has been prepared for small and medium-sized jobbing foundries in need of modernization of their production methods. Except in cases involving specialized work, most foundries employing hand methods have found it difficult to compete against mechanized plants on the basis of both quality and cost.

If the foundry cannot afford a complete sand and mold handling system at one time, a gradual, step-by-step modernization program should be established. The savings obtained in the first period of modernization should be used to finance the next step of the predetermined program. A long-range view must be taken to visualize the final stage of the system to insure that, in the progressive mechanization, each step fits the following one and that each phase can operate efficiently no matter if or when the next step is installed.

In developing a foundry mechanization program, efficient molding, melting, and casting cleaning equipment has to be tied in and adjusted to an over-all carefully prepared sand and mold handling layout. Sand is the most voluminous solid material used in the foundry, and its proper method of handling is a very important factor contributing to the reduction of manufacturing costs.

The advantages of sand handling mechanization are many. Used sand is removed from the floor, screened, cleaned of metal contamination, and stored in a bin or silo. It is reconditioned by proper mulling, assuring uniformly distributed binders and moisture. This treatment in turn reduces the variations in prepared sand qualities and consequently the possibility of unnecessarily high percentages of scrap castings.

Provisions for overhead sand and simplified mechanical methods of handling of molds will increase molding production to an extent depending, of course, on molding and pattern equipment and type of castings produced.

Finally, a centralized shakeout operation with the use of mechanical units will reduce to a minimum the most unpleasant, back-breaking operation and provide for better and cleaner working conditions for everyone in the foundry.

The purpose of this paper is to indicate the basic types of sand and mold handling equipment and to show some typical layouts. This survey may bring nothing new to foundrymen already enjoying the benefits of mechanization, but it may serve as a guide for those who are ready for methods modernization.

Sand Preparation—The first step in a modernization program is to employ a molding sand preparation method which will insure uniformity of each batch of prepared sand. Starting with the simplest layout of

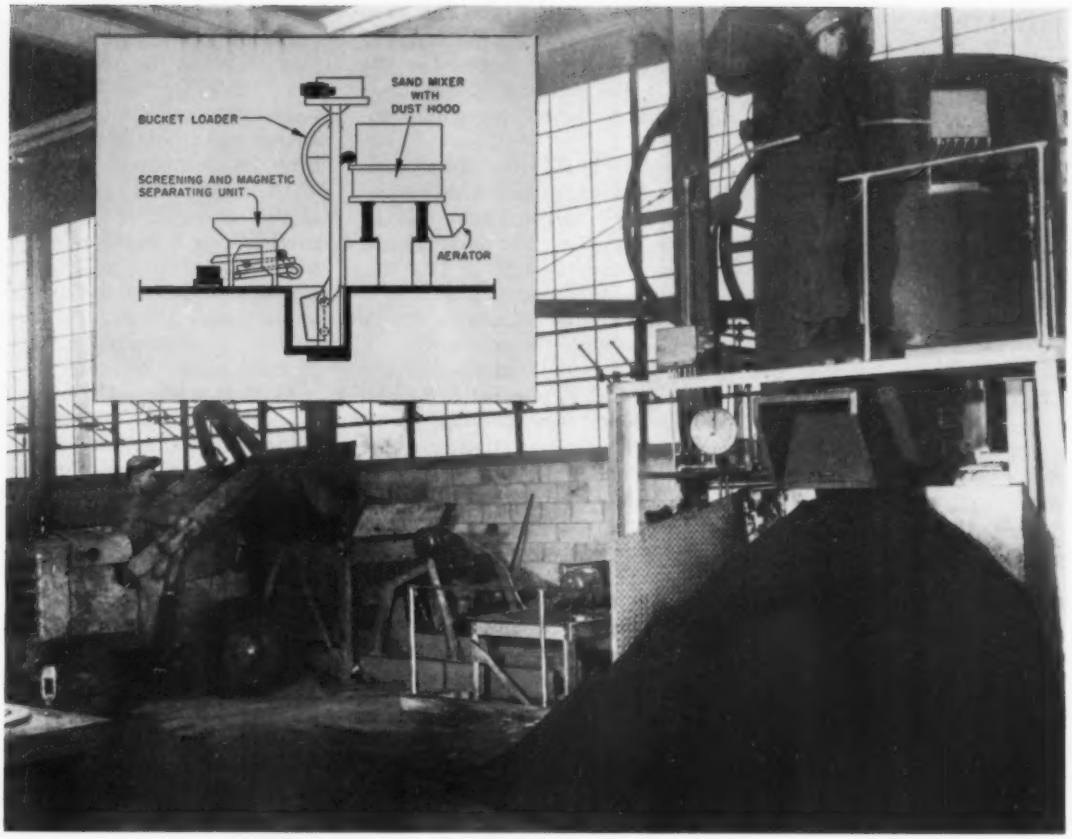


Fig. 1—Drawing of a complete sand preparation arrangement includes the screening and magnetic separating unit, bucket loader, sand mixer, and aerator. Fig. 2—In foundry scene, front-end loader is charging shakeout sand into receiving hopper

basic units for the reconditioning of used sand, Fig. 1 illustrates a complete sand preparation arrangement. Screening and magnetic separation are done in the first unit, which usually is charged by a front-end loader or a box suspended from an overhead crane.

The rate of sand feed from the receiving hopper and the intensity of the vibration of the screen can be adjusted to suit the consistency of shakeout sand. The magnetic head pulley of the conveyor running under the screen assures elimination of metallic particles which passed through openings of the screen. The oversize sand lumps are crushed by adjustable breakers, suspended over the tail-end of the screen deck.

Screened and cleaned sand fills the bucket of the loader to a certain level which can be controlled by a probe attached to the side of the bucket. When the sand in the bucket reaches the probe, the screen-

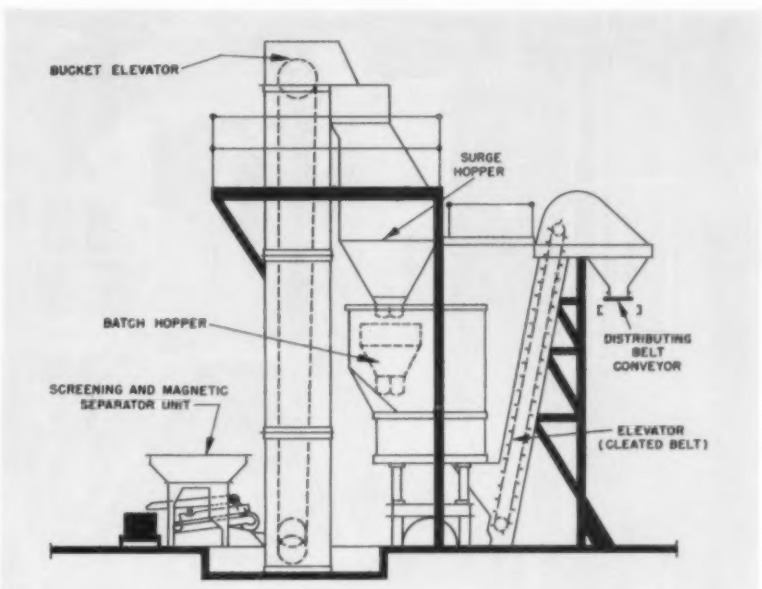


Fig. 3—Elevator lifts clean, screened sand to surge hopper. Sand is mulled, lifted by elevator, and fluffed at discharge onto distributing belt conveyor

ing unit is stopped. After charging the mixer, the bucket returns to its loading position, contacts a limit switch and restarts the operation of the screen.

After mulling, the sand passes through an aerator and is ready for molding. Sand usually is discharged onto the floor from where it can be scooped up by a front-end loader and delivered to the molders as needed.

Compared with the old method of cutting used sand on the floor and adding water and binders "by feel," this arrangement, using a minimum of floor space, will provide a properly prepared sand. The cost per ton of prepared sand will depend on electric power consumption and maintenance of the mixer.

A similar arrangement is illustrated in Fig. 2. A front-end loader is shown charging the receiving hopper of the screen. The double-deck screen-feeder passes the usable sand onto the lower deck of the vibrating trough. The screened sand then is transferred over a short magnetic belt conveyor and is charged by a bucket loader into the sand mixer. After mulling, the prepared sand is aerated and deposited on the floor to be delivered by the same front-end loader to the molding stations.

Both of the described units usually are used on the second shift when all of the shakeout sand can be screened, cleaned, and reconditioned for use the next day.

A more developed arrangement is shown in the layout sketch, Fig. 3. The substitution of an elevator for the bucket loader and the addition of surge storage and batch hoppers permit continuous operation of the mixer. The aerator attached to the mixer in the previous arrangements is replaced here by a very practical and efficient unit which performs the functions of both an elevator and an aerator. It lifts the prepared sand to the height required for overhead distribution and fluffs it at the discharge onto the belt conveyor.

As shown on the sketch this unit essentially is a rubber belt with cleats. When the belt is run very fast it picks up the sand from the receiving hopper and delivers it in an uninterrupted flow to a hopper over the distributing belt.

The main additional advantage of this layout is the provision for overhead sand at the molding stations. By eliminating the shoveling of sand from the floor, fatigue of the molder is reduced considerably for what results in an increase in mold production.

Mold Handling—Up to now we have described the arrangements of equipment dealing with sand only. The next layout and three photographs will show the adaptation and development of these units to handle sand and castings.

The poured molds, after removal of weights, bottom boards, jackets or flasks, are scooped from the floor by a front-end loader and delivered to the receiving hopper as shown in

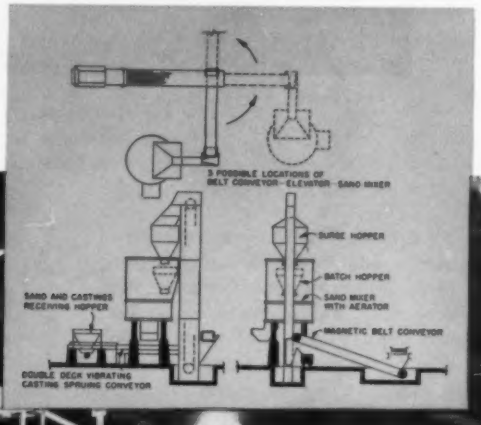
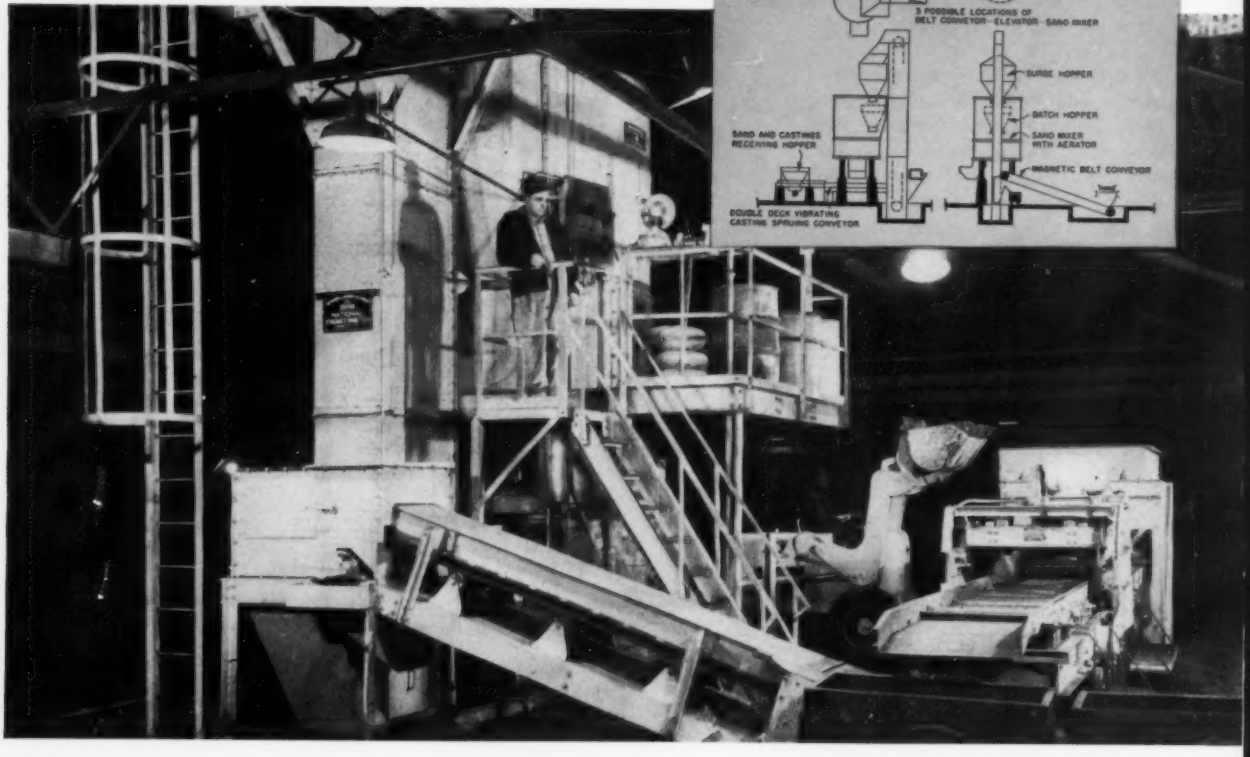

3 POSSIBLE LOCATIONS OF BELT CONVEYOR-ELEVATOR-SAND MIXER
SURGE HOPPER
BATCH HOPPER
SAND MIXER WITH AERATOR
MAGNETIC BELT CONVEYOR
SAND AND CASTINGS RECEIVING HOPPER
DOUBLE DECK VIBRATING CASTING SPRUING CONVEYOR

Fig. 4 (top right)—Drawing shows mechanized unit for handling sand and castings and screening, cleaning, and preparing molding sand. Fig. 5 (below)—A view of this sort of installation



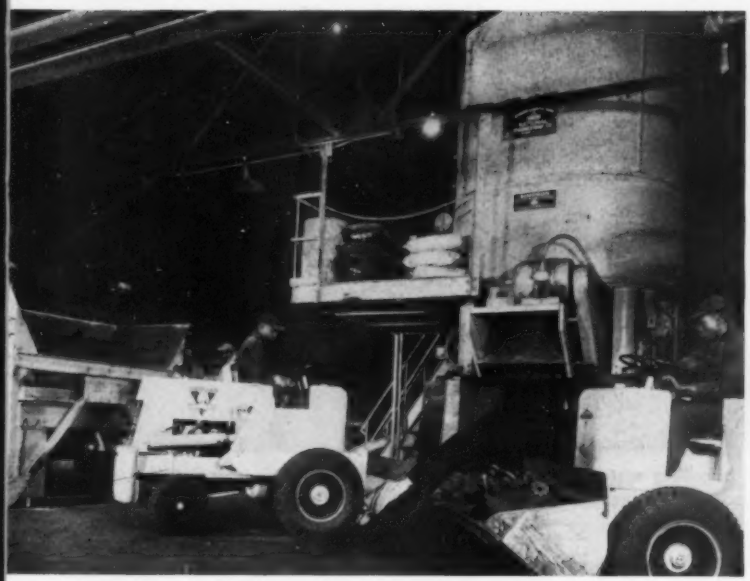


Fig. 6—View of front portion of installation in Fig. 5 shows front-end loaders in action

Fig. 7—View of central part of installation in Fig. 5 shows double-deck vibrating conveyor

Fig. 4. Sand and castings dumped into the hopper are fed onto a double-deck vibrating conveyor. The castings proceed slowly on the upper perforated deck of the conveyor where the gates and risers are knocked off.

Meanwhile, the usable sand is moved on the lower deck of the vibrating conveyor, transferred to a magnetic belt conveyor, lifted by an elevator, and deposited in a sand storage hopper. The castings, without gates, proceed along the upper deck of the vibrating conveyor until they drop into metal boxes at the discharge end of this unit. The sand reconditioning operation is similar to the ones described previously.

It is interesting to note that in this layout the sand conveying equipment can be arranged in three different positions, as shown in dotted lines on the sketch.

Fig. 5 illustrates a similar installation. In the background, a front-end loader operator has the bucket in the upper position and is about to charge the sand and castings into a receiving hopper. At the end of the vibrating double-deck conveyor, metal boxes are placed to receive precleaned castings. Directly in front an inclined and completely enclosed magnetic belt conveyor is delivering sand to an elevator.

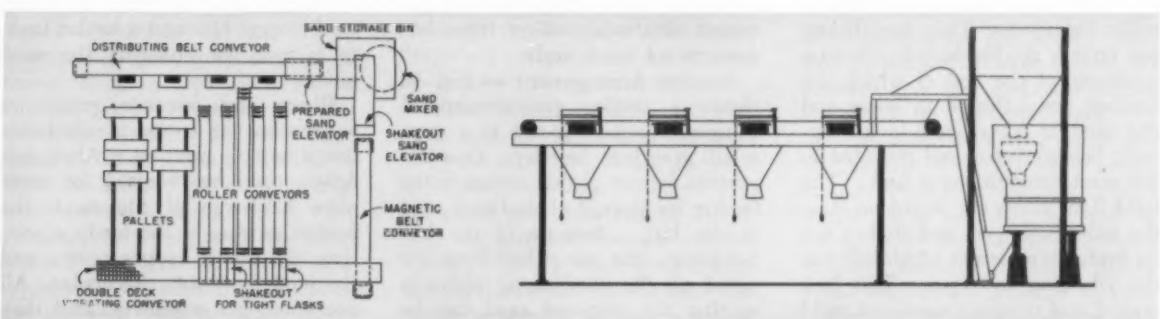
Fig. 6 shows one front-end loader bringing the sand and castings to be dumped into the receiving hopper while another loader is scooping the prepared sand from the floor for delivery to the molders.

Fig. 7 illustrates the central part of the installation, where the castings, after being detached from the gates, are discharging from the upper deck of the vibrating conveyor into cars for delivery to the cleaning room.

Combined Systems—Let us now consider layouts combining both sand and mold handling systems, starting with the simplest one. Using most of the equipment described in previous arrangements, the layout sketches shown in Fig. 8 and 9 represent a typical system for four molding stations. This layout lends itself to molding in either snap or tight flasks, and permits selective pouring and cooling of molds.

The mulled sand is discharged

Fig. 8 and 9—Plan view and elevation show typical sand and mold handling system for four molders. It includes cleated belt elevator, floor-operated plows, pallets, roller conveyors for storing and pouring molds, and shakeout conveyor



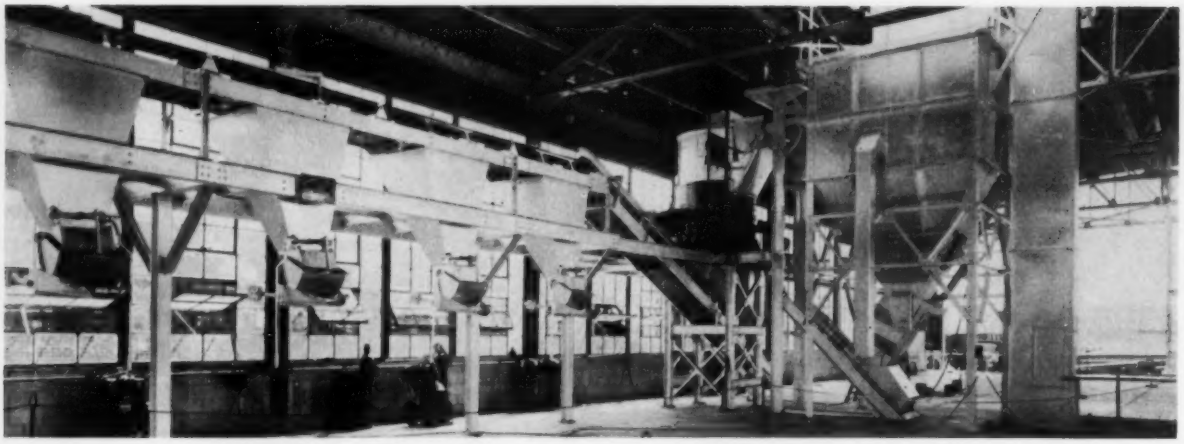
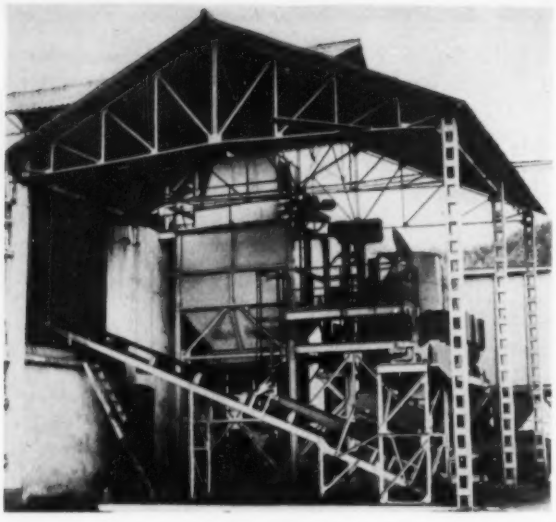


Fig. 10—Typical sand handling system is being erected in a small gray iron foundry. Because of low headroom, the mixer has been set up on the sand distributing platform



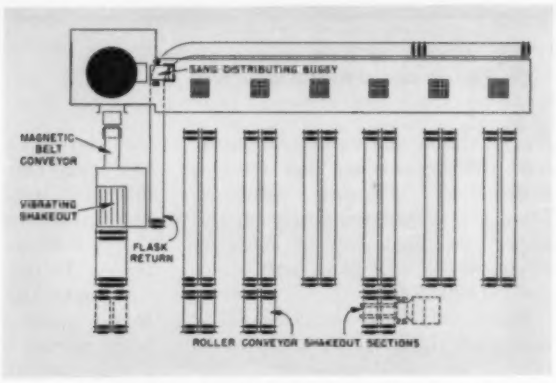


Fig. 12—Sand and mold handling system for six molders. Roller conveyor sections transfer poured molds

Fig. 11—Sand preparation plant with all auxiliary equipment outside existing building of small foundry

from the mixer and is delivered via elevator to a distributing belt conveyor. The plows on the belt are hand-operated from the floor by the molders. The supporting structure is of simplest design with no service walks or platforms.

The completed molds are stored, poured, and cooled on pallets or roller conveyors. They are shaken out onto a double-decked vibrating conveyor, at the end of which the castings are collected in boxes and the sand is transferred to a magnetic belt conveyor and returned to the sand reconditioning unit. The tight flask molds are picked up from the roller conveyors and shaken out on bridge type grates straddled over the vibrating conveyor. This is a typical and complete sand and mold handling system most adaptable for a medium-sized jobbing foundry. It can also be designed to serve a larger number of molders.

The important improvement of this layout is the mold carry-out equipment. This equipment, when combined with overhead sand distribution, can result in double the output obtainable before these improvements were made.

Another Arrangement — Fig. 10 shows a similar arrangement of equipment being erected in a new, small, gray iron foundry. One important feature of this system is the facility for storage of shakeout sand in the bin. Because of the low headroom, the mixer has been situated on the distributing platform so that the prepared sand can be discharged downward onto the inclined section of the belt conveyor. Used sand, after passing through a vibrating shakeout and magnetic belt conveyor, is lifted by an elevator, discharged into a revolving screen on the top of the bin, and stored for reuse. A batch hopper is attached to the lower part of the sand storage bin, and a bucket loader is used for charging the sand mixer.

When the operator presses a pushbutton the bucket is raised into the dumping position. After sufficient time has elapsed for complete discharge of the sand, the bucket returns to the loading position, the batch hopper opens, and the sand flows into the bucket. All operations are automatic, and they

Fig. 13—Lift truck picks up transfer roller conveyor section and lifts it to height of another roller conveyor which delivers molds to shakeout

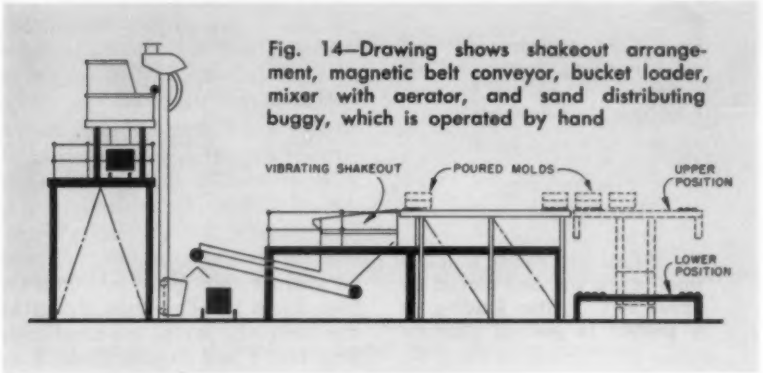


Fig. 14—Drawing shows shakeout arrangement, magnetic belt conveyor, bucket loader, mixer with aerator, and sand distributing buggy, which is operated by hand

Fig. 15—Operator discharges prepared sand from buggy, through a grate, into a molder's hopper

are controlled by a sequence timer.

Foundrymen often have hesitated to install mechanized systems in their shops because they felt that their buildings were too low. Fig. 11 shows how a sand preparation system, similar to the one shown in Fig. 10, can be situated in a compact manner outside the foundry building. This is a very practical solution, well to remember.

Portable Conveyors — Another rather unique but very practical development of a mechanized sand and tight flask mold handling system is illustrated in four layout sketches and photographs. Fig. 12 shows the plan view of a system utilizing portable sections of roller conveyor for moving the poured and cooled molds from the molding floor to the shakeout. The portable conveyor sections with molds are picked up by a fork truck and lifted to the height of another roller conveyor used for delivering molds to the shakeout station. Fig. 13 illustrates this type of operation.

Fig. 14 (the elevation of plan view Fig. 13) shows how the roller conveyor transfer section is lifted and how the shakeout sand is handled by magnetic belt conveyor and charged by a bucket loader into a sand mixer equipped with an aerator. After mulling and aeration, the prepared sand is discharged into a hand-operated, bottom-gate buggy and distributed through the grates in the platform into the molders' hoppers, as shown in Fig. 15. The castings, via chute, are deposited in boxes on the floor, and the empty flasks are returned to the molders by gravity roller conveyor.

Pallet Handling—Because snap flask molding and pallet conveyor mold handling are about the most appropriate methods recommended for small or medium-sized foundries, we want to present another layout (Fig. 16) illustrating a complete and efficient installation. This system is suitable for use with low headroom and requires only one small pit for a bucket loader. The sand preparation arrangement, shown in elevation, is typical for small operations and was described previously. The mold handling system operates in the following manner.

The finished molds on bottom boards are placed on pallets positioned on the upper track. Each pallet, loaded with molds, is pushed by the following pallet toward the pouring platform. After pouring and cooling, the molds are shaken out by means of a tilting device. This device dumps the molds onto a floor grate or vibrating conveyor while the pallets with bottom boards, which are held by cleats on the dumping tables, are returned by gravity, via the lower tracks, to the molders.

Fig. 17 shows how an empty pallet is placed on the upper track. The pallets with bottom boards, returned from the shakeout station, are visible on the lower track.

Pouring of molds on a pallet system usually is done from a monorail, as shown in Fig. 18. Short bridge cranes may also be used. In the same photo can be seen mold weights suspended from cables. These weights are operated by compressed air cylinders and are low-

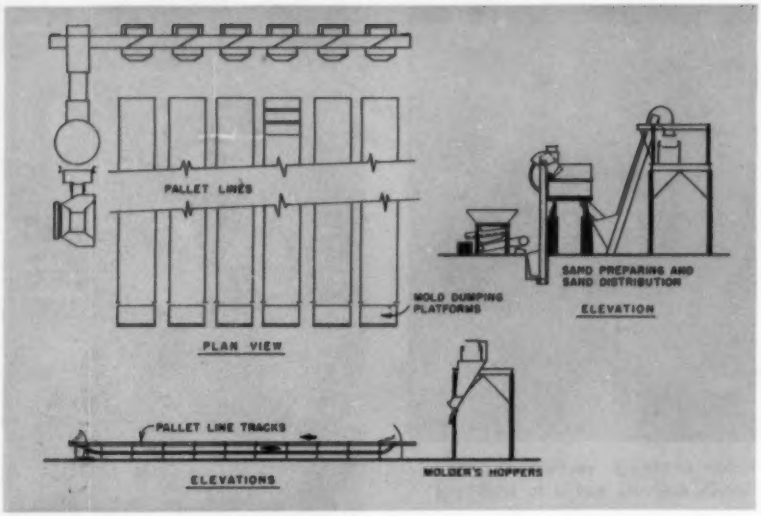
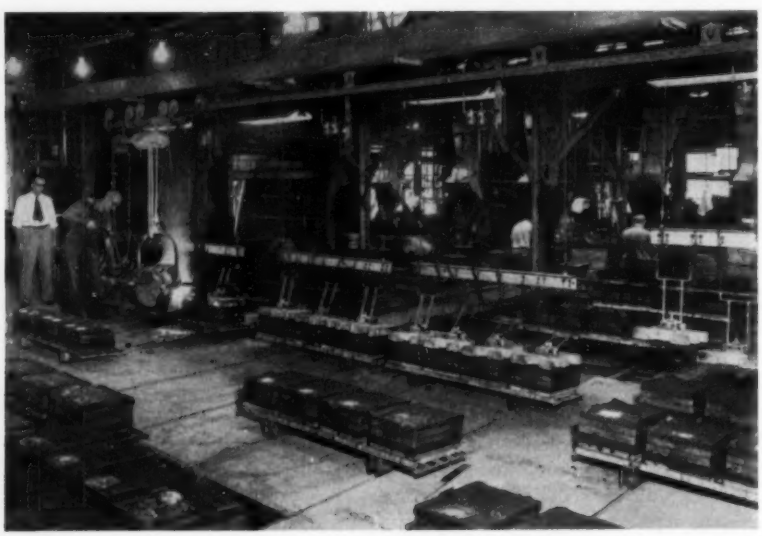


Fig. 16 — Complete sand and mold handling system for six molders uses pallets to store and pour snap-flask molds

Fig. 17—Empty pallet is taken from return line and placed on upper line. After loading, it is pushed to pouring platform

Fig. 18—View of pallet system with weighted molds ready for pouring and poured molds waiting to be shaken out



ered slowly onto the molds before pouring. After pouring, the molds minus jackets are dumped on the vibrating double-deck conveyor as shown in Fig. 19.

The two main advantages of the pallet arrangement are having the molds located close together, and allowing the use of the entire floor space for mold storage. This layout also provides flexibility in handling molds of different sizes. The same size pallet can carry two large or four to six small molds. The length of the lines can be adjusted to suit the production within the limits of the space available. Each molder can have for his production either one long or two short mold storage lines.

Steps in Mechanization—The last composite layout sketch, Fig. 20, illustrates a step-by-step mechanization program, the wisest course for a small foundry embarking on a modernization program.

The initial step will require the greatest capital investment, but it will provide for increased production of higher quality castings and, consequently, for greatest savings. The profits from the first step will be used for subsequent additions on Step 2 and 3. The units shown in this composite layout are numbered. Step No. 1 will require Units 1 to 8, Step No. 2 addition of Units 9 to 13, and finally Step No. 3 will add Units 14 to 16.

We assume the use of four jolt-squeeze molding machines for this step of modernization. Prepared sand will be brought to the molders by a front-end loader. Finished molds will be placed on roller conveyor sections, set one behind the other to build one line serving two molders. When the molds reach the end of the line they are set by helpers on the floor for pouring. Gradually, when the floor becomes filled with molds, the roller conveyor sections, one by one, are removed and stacked to be used again the next day. The same arrangements as shown for the first two molding machines, also applies to the other two (pallets and roller conveyors will be described in Steps 2 and 3).

Mold shakeout usually is done on second or third shift. Sand and castings are brought by a front-end loader to a floor grate (Unit 1) positioned over the tail-end of the

magnetic belt conveyor (Unit 2). Next, the sand is lifted by an elevator (Unit 3), passed through the screen (Unit 4), and deposited in the silo (Unit 5). Through an opening in the wall, the sand from the silo will be delivered by a gate to the bucket loader (Unit 6). The additions will be made in the bucket and the batch charged into the sand mixer (Unit 7). Prepared sand will be delivered by the front-end loader and finished molds handled on the roller conveyor sections (Unit 8).

The second step of mechanization will include two very important improvements contributing to the increase of productivity—overhead sand and mold handling pallet lines. To get the prepared sand overhead an elevator (Unit 9) is used to lift the sand, fluff it at the discharge, and deliver it to a distributing belt conveyor (Unit 10). The molds poured on the pallets will be shaken out on the grates (Unit 11), the castings deposited in the boxes and the sand transferred by the vibrating shakeout conveyor (Unit 12) to the previously installed magnetic belt conveyor. The handling of molds on the pallets (Unit 13) has been discussed before.

The third step consists of the addition of two larger molding machines, such as jolt-pin-lifts, using tight flasks. As shown on the layout, the supporting structure and distributing belt conveyor (Unit 14) will be extended to provide overhead sand for these two additional machines. The molds will be stored and poured on the four lines of roller conveyors (Unit 15), the middle line being used for return of empty flasks. After pouring and cooling, the molds via transfer car (Unit 16) will be delivered to the shakeout floor grates.

The sand and mold handling layouts described previously are typical of small foundry installations. They may serve as recurring patterns to be adjusted to suit local conditions. The application of proper equipment will accelerate the flow of sand and reduce its operating volume. More molds will be made and poured on the same floor space and fewer men will be required.

Watch for Bottlenecks—With the exception of very small foundries, modernization programs should be started simultaneously in all main sections of the foundry. Rapidly increasing mold output, due to the use of the overhead sand and mold handling systems, may be slowed down by the inefficiency of the coreroom or congestion in the cleaning room. Capacities and performance of auxiliary sections of the foundry must be adjusted to keep pace with the increased production of the molding department.

A careful study of the shortcomings of existing methods and a thorough analysis of production requirements should result in an effective layout, flexible enough to take care of changing rates of production.

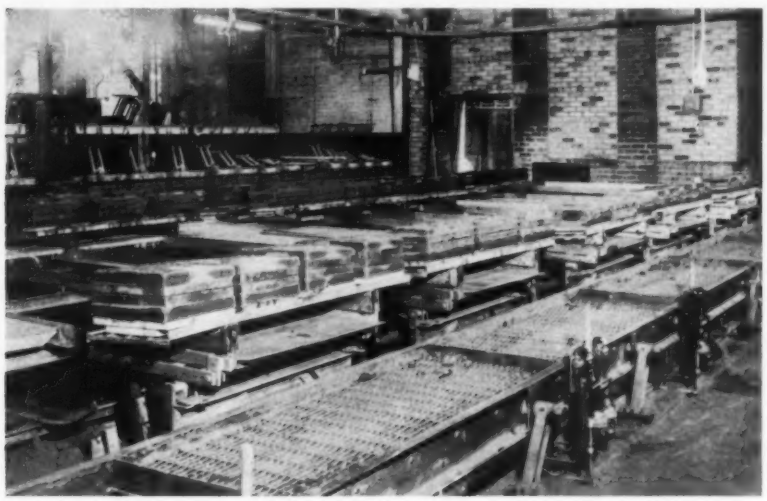
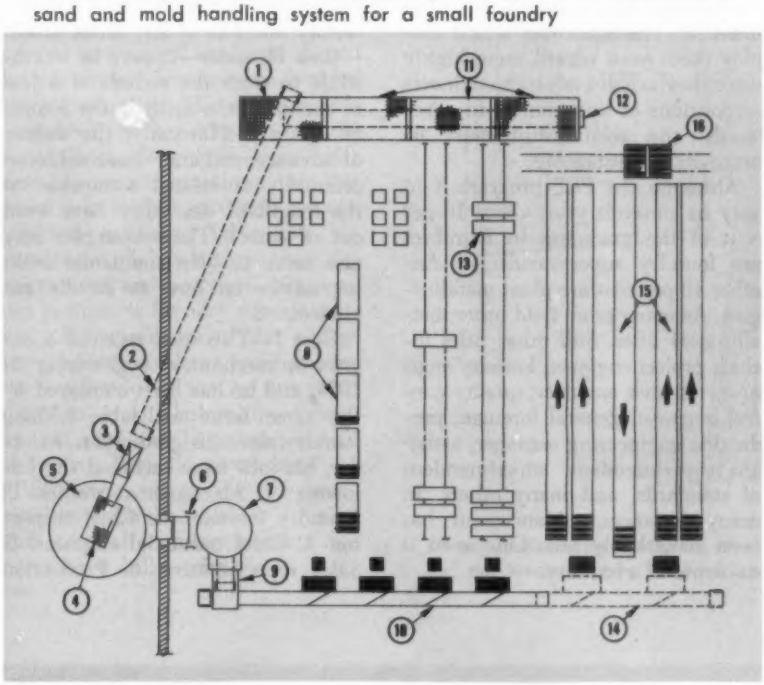


Fig. 19—Poured molds, minus jackets, are shown on the dumping platform, ready for shakeout on double-deck vibrating conveyor

Fig. 20—Composite sketch shows three-step development of a mechanized sand and mold handling system for a small foundry



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Engineering graduates in the foundry industry usually advance quickly

What Happens to FOUNDRY

By JACK C. MISKE
Associate Editor

● WHAT HAPPENS to engineering graduates with foundry training? Do they enter the cast metals industry? If they don't, is their foundry training still valuable to casting producers through work in such related areas as design, procurement, materials development, or similar activities?

Survey Gets Answers—Last year the Foundry Educational Foundation surveyed a random sample of about 150 former FEF scholarship holders to get the answers to these and other questions. This article is based on questionnaires returned by approximately two-thirds of the engineers surveyed. These men were asked to summarize their employment records and duties and to comment briefly on their foundry training at college. Many of them also discussed either the foundry industry as a place to work or the use of castings by the nonfoundry firms which employ them.

Where They Work—Most are employed in foundries—foundries of all types and sizes, in all parts of the country. About half of the others are in positions where their knowledge of cast metals enables them to consider castings for applications in their companies' products. Of the remainder, many work for various types of metal suppliers, in such varied areas as research, production, and sales. A few are out of the metals industries entirely, in such fields as teaching, electronics, and the military services.

What They Do in Foundries—The types of positions held by those who work in foundries would seem to indicate two important facts: 1. Engineering graduates who enter the cast metals industries usually achieve excellent personal advancement. 2. The foundries which employ them must regard them highly since they rapidly advance engineers to positions of importance. In other words, the relationship must be mutually advantageous.

Although the FEF program is in only its eleventh year, about 10 per cent of the graduates in foundries are foundry superintendents. Another 10 per cent are plant metallurgists. As many more hold other metallurgical titles. Still other titles include project engineer, foundry engineer, research engineer, quality control engineer, general foreman, production engineering manager, assistant superintendent, superintendent of standards, and many others. In many instances, advancement has been remarkably fast. One even is co-owner of a foundry.

It is interesting to note that no one expressed regret for having made the foundry industry his career. On the contrary, some took it upon themselves to express their personal satisfaction with the field. A number of the men not working in foundries even stated the hope that they could enter the cast metals industry at some future date. More than one commented that his only reason for not having done so in the first place was the lack of satisfactory offers or of any offers at all.

Case Histories—It may be worthwhile to trace the records of a few of the men who entered the foundry industry. Naturally, the degree of advancement they have achieved ordinarily is related somewhat to the length of time they have been out of school. These examples may also serve to help companies seeking advice on how to handle engineers.

Case I—This man received a degree in mechanical engineering in 1951, and he has been employed by the same large malleable jobbing foundry since his graduation. In order, his jobs have included the following: 1. Management trainee. 2. Foundry foreman. 3. Chief inspector. 4. Chief industrial engineer. 5. Sales representative. 6. Production

ENGINEERS?

This article is the last of three on the subject of foundry engineers which have appeared in FOUNDRY during the last two years. The first, in April, 1957, dealt with recruiting engineers, and the second, in March, 1958, concerned in-plant training programs for engineers. The current article is based on a random survey of about 150 former Foundry Educational Foundation scholarship holders. It describes the industries in which they are employed, the types of jobs they hold, and their comments on their training and their reactions to the cast metals industry

engineering manager.

His responsibilities in his present position, the last listed, include quality control, design engineering, industrial engineering, and pattern and die repair. The man states, "I can say without reservation that without the aid of my FEF scholarship and the foundry option in industrial engineering at my school, I would not have entered the foundry field."

Case II—This individual was graduated in 1953, also with a degree in mechanical engineering, and he has worked for the same foundry since graduation. His company is a medium-sized organization in the East which casts gray iron, brass and bronze, and aluminum. He was hired as a metallurgist with responsibilities including laboratory supervision and handling of new developments and processes. His present position is foundry superintendent. He comments, "My college training was excellent and has been very valuable to me in my work. Contacts and relationships formed at that time also have been of value to me. I would recommend the (FEF) program to anyone interested in a career which is different and unusual in many respects and never has a dull moment."

Of the engineering graduates who did not enter the foundry industry, many did not because they received no satisfactory offers or any offers at all

Case III—An interesting case history is that of a 1956 graduate in industrial engineering. This man now is serving in the Air Materiel Command, U. S. Air Force, as a project officer in the Manufacturing Methods Branch. Between graduation and the time he entered military service, he was employed as a casting development engineer for a medium-sized foundry which is known for its production of difficult, precise castings. His particular province in the operation was "to devise and develop unique casting methods for difficult casting problems in aluminum and ductile iron."

In a long comment, he said, "I am convinced that the specialized training I received in college in the metal casting industry has been and will continue to be of extreme benefit to me . . . When I first began the foundry option at school, I had no real interest in working for a foundry . . . However, the courses were so interesting and well taught that I soon developed a genuine interest in the industry . . . When I am separated from the Air Force in 1960, I intend to go back to my company, for I have found that development work in the precision casting field is highly interesting and rewarding . . . Your scholarship was of great financial aid to me."

Building Casting Markets—One of the more important aspects of foundry training for engineers is the opportunity to make them aware of the nature and potentials of cast metals. It is as vital to the future of casting producers to indoctrinate engineers who will use castings as it is to train those who will make castings. Accordingly, the comments of some engineering graduates employed with companies which use castings are of considerable interest.

A project engineer for an aircraft company says, "The foundry training I received was excellent. It was and still is valuable to me as an aid in understanding the intricacies involved in the manufacture of composite assemblies containing castings."

A design engineer employed with a prominent manufacturer of engines and compressors reports that his foundry training in school is "very helpful in my present work, although I do not deal directly with the foundry industry." Similarly, a metallurgist who formerly did material evaluational development work for a missile manufacturer and now is in research says, "I believe that foundry training is valuable since even those not in the foundry industry have an awareness of the usefulness of castings."

An application engineer in the blower department of a large company is even more to the point: "Foundry training is essential. Even in applying blower units, consideration must be given to pattern changes, material selection, and a knowledge of foundry practice." A similar sentiment is expressed by a senior engineer with an automotive company who works with truck chassis design. He states, "The foundry training I received has been valuable to me because it provides a basis for passing judgment on casting design and application."

Others echo this feeling that the foundry training they received in school has been of help to them in their jobs outside the foundry industry. The important point to the casting industry itself is, of course, that these men are aware of the capabilities and applications of castings and that they can make intelligent decisions as to their use.

The Lost Battalion—One more group remains—those engineers who are employed neither with foundries nor with consumers of castings in positions where they can influence the selection of cast materials. Many of these are not a total loss since they work for firms supplying the foundry industry, particularly for producers of pig iron, primary and secondary aluminum, and other metals.

Even with those who have no connection with the casting field, there are some consolations. A number expressed the feeling that they might yet enter the foundry industry. None expressed any regret for having taken the foundry courses they did. Many stated that their training has stood them in good stead in spite of their separation from the industry.

The Summing Up—A number of facts stand out. Most of the engineers who received help from the foundry industry have reciprocated by making it their career. More would have done so had the opportunity been presented, in the form of good job offers. In addition, the industry has gained through the awareness of many design, application, and process engineers of the usefulness of cast metals.

"The foundry training I received has been valuable to me because it provides a basis for passing judgment on the design and applications of castings"

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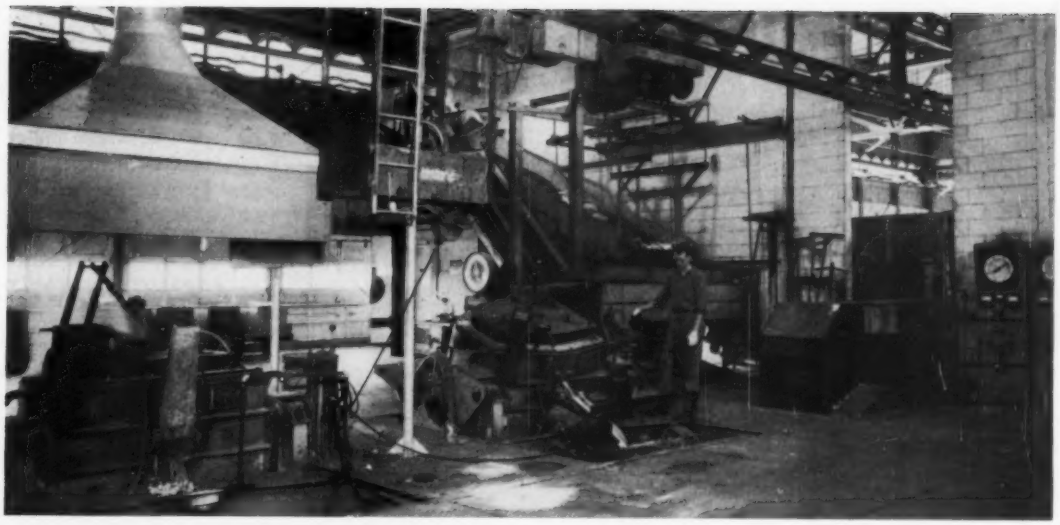

One man handles all melting department operations, including delivery of molten metal to diecasting machines. Three electric furnaces melt 1000 lb each per hour

MODERN DIECASTING PLANT . . . Designed for Future Expansion

● USE of diecast aluminum components in its products has been on the increase at Rockwell Mfg. Co., Pittsburgh, since eight years ago. At that time, the company initiated a program to review its product engineering to determine new uses for aluminum. So many have been found that Rockwell has built an aluminum diecasting plant at Russellville, Ky.

The new plant casts more than 100 different components for the firm's meters, valves, power tools, and other products, and the list of diecast aluminum components is growing constantly. This trend to aluminum is the result of general efforts to cut costs and improve products without increasing prices. Aluminum's light weight, corrosion resistance, and good machinability help Rockwell to achieve these goals.

Designed for Expansion—Layout and facilities of the diecasting plant were designed for efficient operation in current production and for rapid expansion as the company's use of aluminum grows. Machining facilities have been planned so that automation can be increased gradually as expanding production justifies the cost of automated equipment.

Electric Melting—The building is a T-shaped structure with the foundry in the leg of the T and the machining department at the top. The furnace room is at one end of the foundry. Three electric induction furnaces, each of 1000-lb capacity per hour, are imbedded in the foundry floor, and there is space for three more furnaces in the same line. Furnaces are charged with raw billets handled by a fork truck and with remelt from a reject conveyor line.

Furnaces are emptied into a bull ladle which is handled by a crane running the entire length of the 275-ft foundry area. The man who charges the furnaces also operates the crane car and delivers molten metal to the diecasting machines.

Ten Diecasting Machines—Five diecasting machines, each with its own holding furnace, are arranged on either side of the crane line, which has enough space for ten more units. The largest diecasting machine is a unit with 900-ton locking pressure which casts a 21-lb meter body, the heaviest part produced at the plant. This machine is equipped with an automatic ladling furnace. Output is 50 pieces an hour.

Casting Handling — Diecasting machine operators inspect parts as they take them from the machines, then place them on a conveyor

which runs under a catwalk between the two rows of machines. At the end of the line, castings are stacked on pallets.

Pieces rejected after inspection are placed on the lower level of the conveyor belt and carried back to the furnace room. There, they are channeled 90 degrees onto an ascending conveyor which carries them behind the furnaces.

Scrap is stored either on the ascending conveyor or in two weighing hoppers suspended over it which can be lowered and filled automatically with rejects from the conveyor. The rejects are returned to the furnace room from this point by an extending conveyor which is directed to the furnace to be charged.

Machining Setups—Current Russellville volume doesn't merit full-scale automation. As a substitute, the plant personnel has devised setups that combine operations. Unlike full automation, these setups do not employ a transfer mechanism or feedback. Instead, multiple operations are performed in which the operator's duties are limited to loading, unloading, and actuating the cycle.

These setups are made from standard drill press components. One, for example, is simply an L-shaped row of six presses equipped with special tooling to drill and tap 17 holes in a valve plate at the rate of 151 parts per hour.

In another, a four-spindle drill press line drills and taps holes in the top and side of meter covers. All four tools are controlled by foot-operated pneumatic feed devices. The operator only loads and unloads. Two spindles drill and tap four holes in 272 pieces per hour. In the other two-tool setup, one spindle drills 12 holes while the second taps 8, in 194 pieces per hour. Similar tooling throughout the machining department permits low-cost finishing of castings in small lots.

All of the parts cast at the plant could be finished in completely automated machines, and the company's management is ready to convert to automation on any component when volume justifies the investment. Current plans envision a plant layout in which major castings, now moved on pallets, are conveyorized from casting machines directly to automated machines in the machining department.

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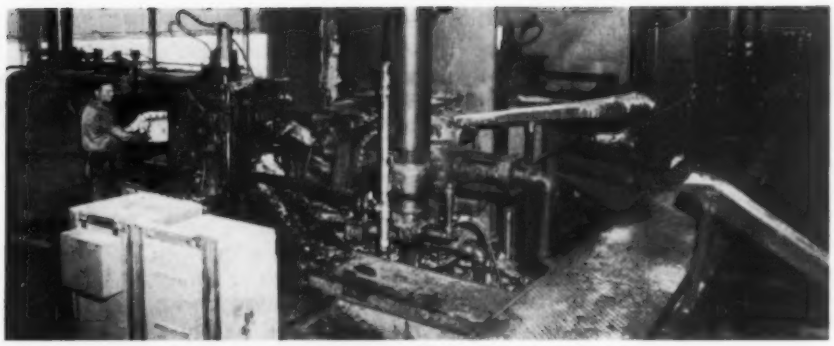
Metal is delivered to individual diecasting machine pots by a bull ladle carried on a crane which runs the entire length of the foundry area. The operator, shown in the crane cab, takes care of all handling operations

Scrap returns to furnace department on lower half of conveyor (far right) which carries finished product to storage area. Scrap is stored on rising conveyor and in hoppers above it. Extending conveyor charges furnaces



Five diecasting machines are arranged on either side of conveyor line. Machine at left has automatic ladling. It produces 21-lb meter cover casting at a rate of 50 pieces per hour

Laboratory for metallurgical analysis is equipped with a photoelectric spectrograph. This unit makes possible direct analysis readings in seconds

Four-spindle drill press line setup is for meter covers. Operator simply loads and unloads. Two spindles, at left, drill and tap four holes in 272 pieces per hour. At right, one spindle drills 12 holes and second taps 8, both in 194 pieces per hour

Questions and Answers

Melting and pouring temperatures for aluminum and nickel silver . . . Definitions of light, medium, and heavy sands . . . Determining weight of castings . . . Proper use of chills . . . Holes are problem in aluminum castings

Temperatures Will Vary

We will appreciate receiving any information on the correct temperatures for melting and pouring aluminum and nickel silver. Also should the sand be dry or wet for this?

Since several castings or molds full of casting cavities usually are poured from one pot or ladle of metal—and that metal is losing temperature during the pouring operation—the actual pouring temperature extends over a range. That is, the metal at the beginning of pouring must be higher by an amount sufficient to permit the last metal in the pot to produce a good casting. Correct pouring temperature, of course, is that which will run the castings full and produce solid castings. Safest procedure is to determine the proper temperature by experiment.

Since nonferrous metals and alloys tend to pick up gases during melting, and the pickup increases with rising temperature, good practice is to melt at the lowest possible temperature. That should include enough temperature above the pouring range to permit skimming and carrying to the mold side.

In general, pouring temperatures are based on section thickness since the volume-area relationship establishes the cooling rate of the metal. Small volume and large surface area of thin sections result in rapid cooling, necessitating higher metal temperatures to insure filling the mold cavity. As section thickness increases, cooling rate decreases, and pouring temperatures may be lower.

For some aluminum castings with heavy sections a temperature of 1200° F might be satisfactory, while with very thin sections the pouring temperature might be as high as 1500°. Usual range is 1250 to 1350° F.

Pouring temperatures of nickel silver will depend on the nickel content. With about 12 per cent nickel the pouring temperature may be from 2050° for heavy sections and 2300° for light sections. Where the nickel content is 16 per cent, the range is 2150 to 2400° F, and in the case of 20 per cent nickel the range is 2200 to 2500° F. Temperature range of 2350 to 2600° is used for the 25 per cent nickel alloy.

We are not quite clear on what you mean by dry or wet sand. Natural green sand for molding should have a moisture content around 7 per cent. Usually, if the sand is too dry, it is difficult to ram properly and tends to drop out and wash. If the sand is too wet, there is a tendency toward blowholes on the surface of the castings.

Terms Signify Sand Type

We have seen references to light, medium, and heavy molding sands and would like to know what those designations mean. Also we would like to know the shrinkage allowance per foot for a bronze liner to be 6 ft OD. Liner is 2 ft high, and this shrinkage is ¼ in. per ft without cores.

Terminology or grading of light, medium, and heavy molding sand refers to the size or section thickness of the casting which can be made with it. Generally the heavy sands are coarse grained and the light sands are fine grained. However, the characteristics and properties of the sands also vary with the type of metal or alloy to be poured into the molds. A heavy molding sand for large aluminum castings would not necessarily be suitable for large iron castings.

Although the patternmakers' shrinkage for bronze is given as ⅛ to 3/16 in. per ft, the actual allowance has to be based on practical experience since it will vary with such factors as whether green or dry sand molding is to be used, the hardness of ramming with green sand, care with which the pattern is withdrawn from the mold, etc. Unless you have a background of experience, it appears advisable to provide the maximum shrinkage allowance. After the casting is made, make measurements to determine whether it contracted that amount.

Determining Casting Weight

Could you supply us with information on how we determine the weight of an aluminum or brass casting from a similar casting made of cast iron? Also are there any tables or figures from which one can find the weight of a casting when the weight of the wood pattern is known?

Determining the weight of an aluminum or brass casting when the weight of the same casting in gray iron is known is not too difficult. It is based on the differences in densities or weight per cubic inch of the alloys. The weights commonly used in the industry are 0.26 for gray iron, 0.1 for aluminum, 0.315 for red brass, and 0.306 for yellow brass.

To simplify the calculation it is easier to use a factor expressing the ratio of the density of one alloy to the other. In the case of aluminum and iron the factor is 0.1 divided by 0.26 or 0.385. Hence, an iron casting of a given weight multiplied by 0.385 will give the weight

of a similar casting in aluminum. The factor for converting iron to red brass is 1.212, and for iron to yellow brass is 1.177.

In determining the weight of a casting from that of a wood pattern, there appears to be a lack of agreement in several tables we consulted; seemingly these figures are unreliable. For example, for a pine pattern weighing 1 lb, the iron casting weights are given respectively as 14.7, 16.7, and 16.5 lb, and for bronze the respective weights are 16.6, 19.5, and 18.5 lb. In all cases the patterns are solid without cores.

Wants To Reuse the Drag

Often we produce small production runs of carbon steel castings in sand molds, commonly called "flat backs"; that is, the mold cavity exists in one side of the mold only. Can you tell us if it would be feasible to construct molds in which the cope would contain the entire cavity, including the gating system, and the drag would be flat and of a material which could be used several times? If that is possible (and economically practical) could you suggest a mold material?

Unless some complications arise in the gating system, it appears that stacking the molds as indicated at the left of the accompanying sketch would be satisfactory since it does not involve any special equipment.

As indicated, a common sprue and riser comprise the gating system, and even if the present gating on the casting is not amenable, possibly some slight changes could be made. In this practice the first mold laid down is a "dummy" in that the sprue and riser openings are plugged to prevent entry of metal. As an alternate, a flask rammed full of sand and struck off can be used.

On the matter of a reusable drag, we can only offer a suggestion. While there are a number of refractories such as firebrick, graphite shapes, chrome-magnesite, zircon sand, silicon carbide, chamotte, forsterite, etc., which might serve, all would require some type of support to withstand rough handling. For that purpose the cast iron or steel bottom board, 2 in. thick, shown at the lower right is proposed.

As indicated, it contains a depression about 1 in. deep with side dimensions slightly smaller than the interior dimensions of the flask. That will provide a smooth, flat surface at the interface of board and flask. The depression can be filled with firebrick splits, graphite slab, or rammed full of a mixture composed of one of the previously mentioned refractories with a small amount of sodium silicate as the binder.

The rammed mixes of course will have to be dried thoroughly to drive off any moisture before being placed in service. Also, at the beginning of each day's use, the refractory should be torch dried to eliminate any moisture picked up since last used.

Chills Fail To Function

We are making some markers of silicon bronze which contain an emblem almost twice the thickness of the remainder of the casting. A copper chill is used in this area to increase the cooling rate. Unfortunately, after a period of one or two months the chills seem to lose their effectiveness, resulting in shrinkage in the emblem portion. Chills are sandblasted, heated to drive off moisture, and shellacked on the edges before use.

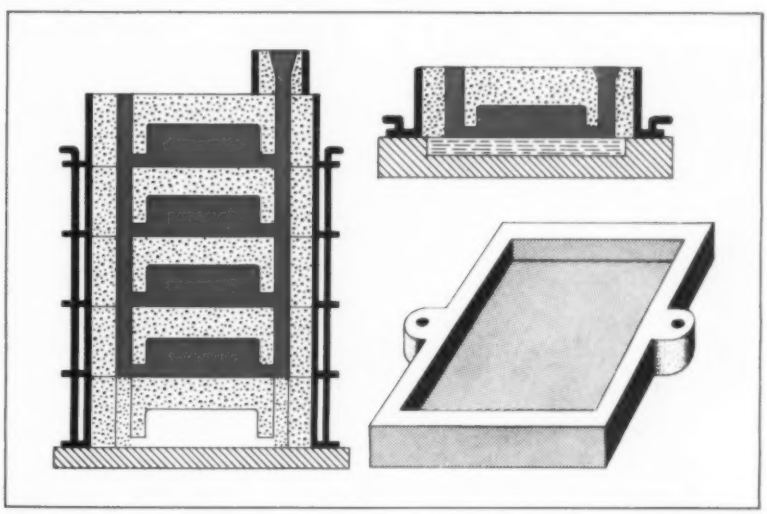
We suspect the difficulty with the chills is due to something other than the chills themselves. You mention that you heat the chills prior to use, and it may be that they are too hot when placed in the mold. Chilling power is determined by the heat capacity, and as a chill becomes heated, it can absorb less heat. Preferably chills should be heated only to the temperature of or slightly above that of the molding sand to prevent condensation of moisture from the damp sand.

The trouble may be a matter of pouring temperature and the chill thickness. The chill should be the same thickness as the section to be chilled. If too thin, it will not have sufficient heat capacity, and if too heavy may have an adverse effect. If the pouring temperature is too high for the sections involved, the heavy section, even with the chill, does not solidify before feeding from the thinner sections is cut off. Conversely, if the pouring temperature is too low, the thin sections freeze off before the heavy section can be fed.

Holes Show Up in Casting

We are making a dish-shaped aluminum alloy casting in a combination cast iron and plaster mold as indicated in the accompanying sketch, and are having trouble with large cavities along the top surface near the inner portion, as cast.

The casting is about 30.6 in. OD, 28.5 in. ID on the bottom rim and 19 in. ID on the top. Pouring is done through a central sprue feeding six radial runners ¾ in. in



Simplest procedure for flat-back work is to stack the molds as shown at left. Proposed permanent drag method is depicted at right

diam with ¼-in.-diam inlets on the underside of the casting. Twelve risers 3 in. in diam are used. Risers and sprue extend 7 in. above the top of the cast iron mold. Holes or cavities are as large as a silver dollar and go as deep as ¼ in. Aluminum, poured at 1250° F, does look a bit cool and folded on the top of the flat section.

From your description it is our surmise that it is due mainly to air entrapment, possibly complicated by low temperature and gas in the metal.

Your system of gating leads to considerable turbulence. Direct pouring into a sprue in the center of a large mold is a definite invitation to air entrainment and turbulence in the metal stream; the lip of the crucible or ladle must be well above the mold so that the ladle bottom does not strike it. Trouble of that sort can and should be eliminated by using a pouring basin which extends from the sprue opening to the edge of the mold.

Another source of turbulence is the small gates or inlets into the casting cavity from the radial runners. Each runner with a diameter of ¾ in. has a cross-sectional area of about 0.44 sq in. The ¼-in.-diam gate or inlet has a cross-sectional area of only about 0.049 sq in. The latter is only about one-tenth the runner area and results in a spirting fountain of metal into the casting cavity. The inlet or gate should have the same as, or, preferably, a larger cross-sectional area than the runner.

We cannot tell definitely from your sketch what the dimensions are at the bottom of the sprue, but the area should be about one-fourth to one-sixth of the combined area of the runners or 0.62 to 0.44 sq in. With a square sprue that would be a side dimension of about ⅝ to ¾ in.

As to temperature, it might be pointed out that the metal has to run a considerable distance before it reaches the cavity, and during that travel a temperature loss occurs even in plaster. Hence, it is advisable to try increasing the temperature in steps of 25° to determine whether any improvement results. Increasing the temperature may eliminate the fold appearance you mention, but it will have little effect on the holes or cavities on the top portion. Your comments on apparent coolness of the metal and the folds leads us to the opinion that the risers are of little service.

Although making the changes suggested in the foregoing might overcome your problem, we believe that more satisfactory results will be obtained by a radical change, as indicated in accompanying sketch B. It involves 1) turning the cast iron mold over, 2) making a plaster mold extending 3 in. above it, and another 1 in. below, 3) use of a circular runner feeding multiple gates into the cavity, 4) pouring basin, 5) risers on the inside close to the casting cavity, and 6) spiral feeders or runners from the sprue reservoir to the circular runner. Spiral feeders are suggested as a means of providing smooth flow into the circular runner and into the gates. Possibly radial feeders might function satisfactorily.

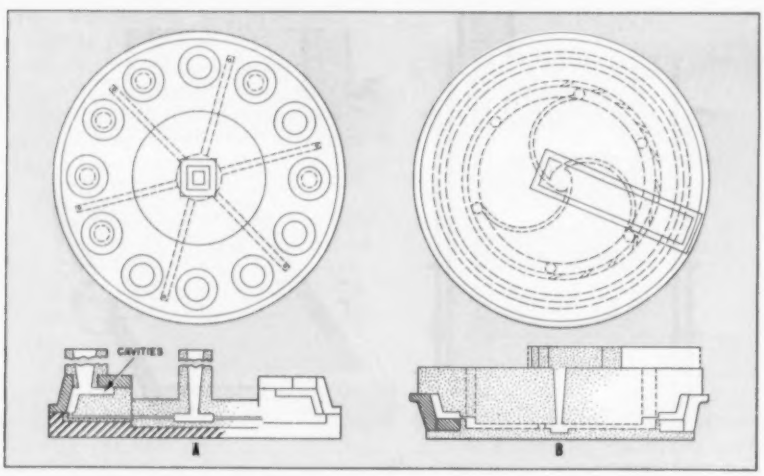
As indicated on the sketch, the portion of the cast iron mold extending beyond the inner edge of the casting is cut off up to the edge of the cavity. The circular runner, 1⅜ in. square, is situated ½ in. from the edge of the cavity. It extends below the cavity 1⅛ in. to permit placement of ⅛-in.-thick gates from the top into the cavity.

Gates are ¾ in. wide and are placed angularly 18° apart, making 20 in number. In their stead you could try ten gates ⅛ x 1½ in. spaced 36° apart. The three spiral feeders are 25/32 in. square or slightly over ⅞ in. in diam for round type. Six risers, 1⅜ in. square or 1 9/16 in. in diam, are placed on the circular runner. Three of the risers are at points where the feeders enter the runner, with the others placed midway between.

Opening at the bottom of the sprue may be ⅝ in. on a side if square or 11/16 in. diam if round. Reservoir under the sprue is 2 in. in diam and 1¼ in. deep. Top of the sprue may be 1 in. square or 1⅛ in. in diam. As indicated, the pouring basin is made so that it extends from the sprue to the outer edge of the mold.

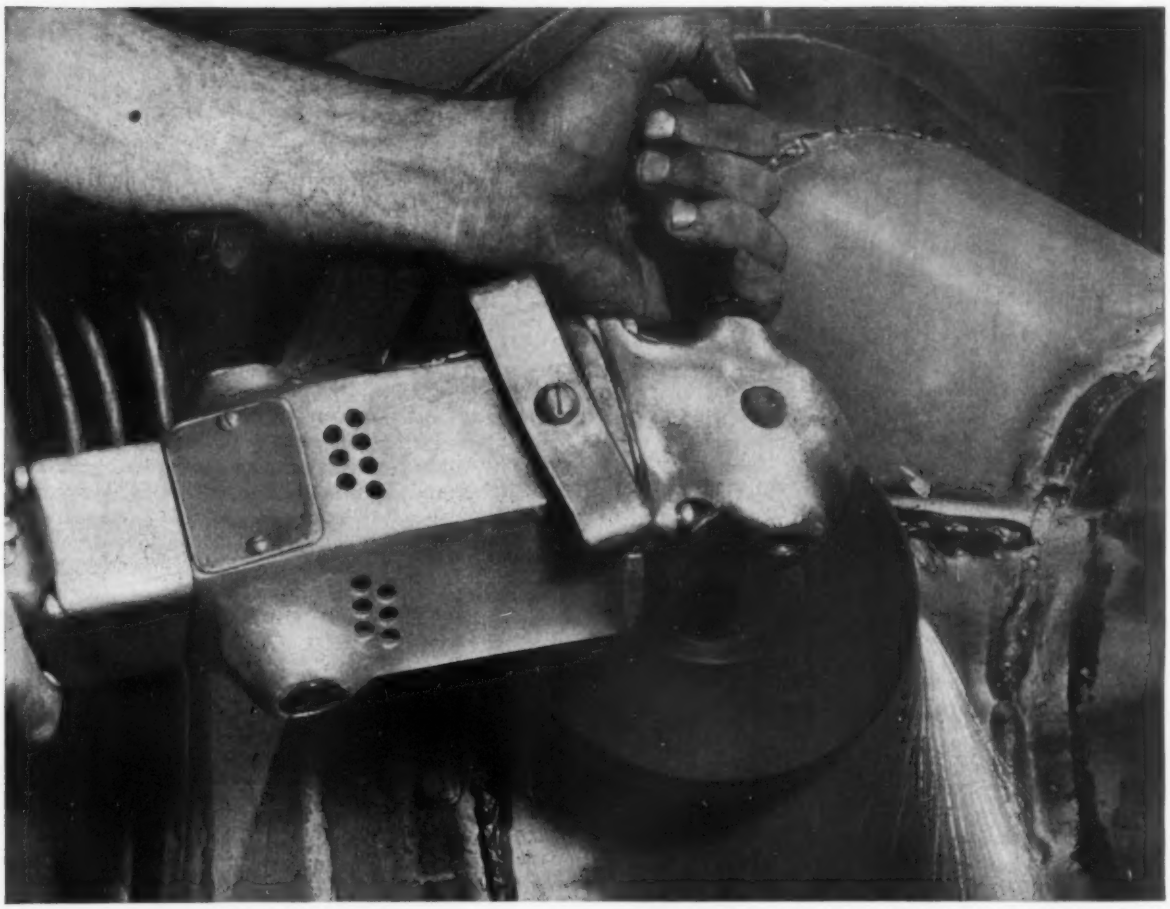
While we believe that use of the pouring basin, taper sprue, and reservoir or sump under the sprue will minimize air entrainment and turbulence, an additional precaution of placing a plug in the sprue opening while the basin is filled with about 1 in. of molten metal will perform two functions. The plug, of course, is withdrawn without interrupting pouring until the metal shows at the bottoms of the risers.

Use of the plug permits only molten metal to enter the sprue because any dross will float on top. Close attention should be given to pouring so that the metal does not overflow through the risers. Best procedure would be to determine the amount of metal required to fill the casting cavity and the gating system, and pour in only that amount.



Sketches indicating present and proposed methods for producing castings in a combination mold made of cast iron and plaster

FLEXLITE RAISED HUB GRINDING WHEELS



Safety guard removed to illustrate full view of Flexlite Grinding Wheel

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CONGRESS and SHOW

To Feature Practices and Products

● LATEST developments in casting practices will receive attention in the more than 100 papers to be presented at the 63rd Castings Congress of the American Foundrymen's Society in Chicago, April 13-17.

In addition, a wide variety of modern foundry products will be displayed at the Engineered Castings Show to be held at the Sherman Hotel in conjunction with the congress. These exhibits will demonstrate to designers and users of castings the versatility of cast components for industrial applications.

Exhibits — Approximately 20,000 sq ft of exhibit space on the hotel mezzanine will be occupied by displays of foundries, producers of metals and alloys, manufacturers of analytical and inspection equipment, and makers of patterns and dies for metal casting.

Casting exhibits will include a wide variety of types, including products for high-temperature applications, magnesium die castings, and castings designed to meet close dimensional tolerances. Several foundries will show aircraft and missile castings.

Papers—About one-fourth of the papers to be presented at Chicago will cover topics expected to interest design engineers. Titles of some of these papers are "X364 Aluminum Diecasting Alloy," "Martensitic White Iron for Abrasion-Resistant Castings," "Interrelation Between Stress Concentration and Castability," "A Discussion of Modern Al-

Among the Exhibitors at the Engineered Castings Show

Adirondack Steel Casting Co., Watervliet, N. Y.
Aluminum Co. of America, Pittsburgh
American Brake Shoe Co., New York
American Smelting & Refining Co., New York
American Steel Foundries, Chicago
Apex Smelting Co., Chicago
Morris Bean & Co., Yellow Springs, Ohio
Bendix Foundries, Bendix Aviation Corp., Teterboro, N. J.
Berlin Chapman Co., Berlin, Wis.
Brillion Iron Works Inc., Brillion, Wis.
Brush Beryllium Co., Cleveland
Buckeye Brass & Mfg. Co., Mansfield, Ohio
Casting Engineers Inc., Chicago
Chicago Foundry Co., Chicago
Consolidated Foundries & Mfg. Corp., Chicago
Crucible Steel Casting Co., Milwaukee
Crucible Steel Casting Co., Cleveland
Curto-Ligonier Foundry, Melrose Park, Ill.
Devcon Corp., Danvers, Mass.
Dixie Bronze Co., Birmingham, Ala.
Doehler-Jarvis Div., National Lead Co., New York
Dow Chemical Co., Midland, Mich.
East St. Louis Castings Co., East St. Louis, Ill.
Engineered Precision Casting Co., Matawan, N. J.
Fabricast Div., General Motors Corp., Bedford, Ind.
Gillett & Eaton Inc., Lake City, Minn.
Hampden Brass & Aluminum Co., Springfield, Mass.
Benjamin Harris & Co., Chicago Heights, Ill.
Harsch Ebaloy Foundries, Rockford, Ill.
Hica Inc., Shreveport, La.
Kaiser Aluminum & Chemical Corp., Chicago
Keokuk Steel Casting Co., Keokuk, Iowa
H. Kramer & Co., Chicago
R. Lavin & Sons, Inc., Chicago
Lindgren Foundry Co., Batavia, Ill.
Love Bros., Aurora, Ill.
Lynchburg Foundry Co., Lynchburg, Va.
Magnaflux Corp., Chicago
Mall Tool Co., Chicago
Michiana Products Co., Michigan City, Ind.
Michigan-Standard Alloy Casting Co., Detroit
Mid-Continent Steel Casting Corp., Shreveport, La.
Misco Precision Casting Co., Whitehall, Mich.
Motor Castings Co., Milwaukee
Mueller Industries, Inc., Aurora, Ill.
Neenah Foundry Co., Neenah, Wis.
Paxton-Mitchell Co., Omaha, Nebr.
Pelton Steel Casting Co., Milwaukee
Pyott Foundry & Machine Co., Aurora, Ill.
Quality Aluminum Casting Co., Waukesha, Wis.
Rausch Mfg. Co., St. Paul, Minn.
Remington Arms Co., Chicago
Roessing Bronze Co., Pittsburgh, Pa.
Rolle Mfg. Co. Inc., Lansdale, Pa.
Scientific Cast Products Corp., Cleveland
Shaw Process Development Corp., Port Washington, N. Y.
Sipi Metals Corp., Chicago
Sivyer Steel Casting Co., Milwaukee
Southern Precision Pattern Works, Birmingham, Ala.
Stahl Specialty Co., Kingsville, Mo.
Superior Foundry Inc., Cleveland
Swedish Crucible Steel Co., Detroit
Universal Castings Corp., Chicago
Universal Foundry Co., Oshkosh, Wis.
Wai Met Alloys Co., Detroit
Waukesha Foundry Co., Waukesha, Wis.
Western Foundry Co., Holland, Mich.

Your Sand System
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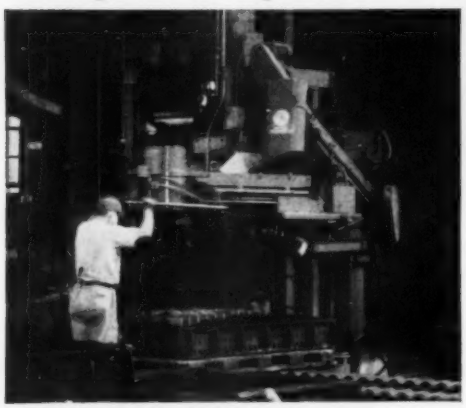
. . . That's why successful foundries invest in NEWAYGO ENGINEERED SAND SYSTEMS and COMPONENTS. Newaygo equipment is "foundry designed" to give continuous performance day after day, month after month, under toughest foundry production conditions.

All NEWAYGO ENGINEERED EQUIPMENT, whether it is a complete system or a component part stresses rugged construction — minimum handling and maximum production.

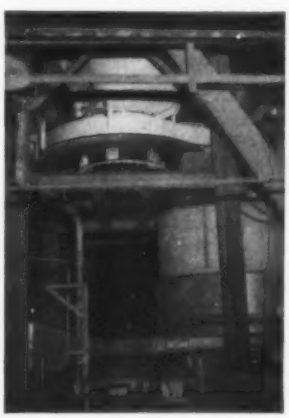
Molding Hoppers and Gates, a typical Newaygo engineered installation showing a bank of 19 overhead molders' hoppers serving cope and drag floors and squeezer molders. Emphasis is on maximum mold preparation with minimum fatigue.



Pivoting Flask Filler, a high speed, high capacity belt-type feeder Newaygo designed to receive sand from storage hoppers, plate feeders, belt conveyors or elevators. Spreads sand uniformly in large flasks on rollover machines or for floor molding.

Rotary Plate Feeder

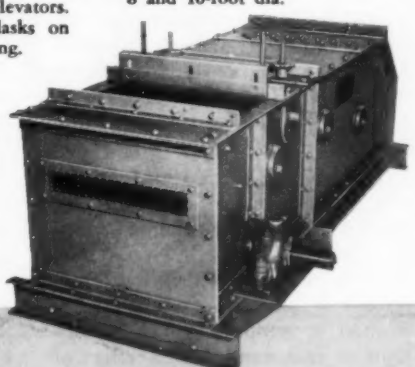
Positive volume feeder supplying a steady controlled flow of sand from 0 to over 100 tons per hour. Newaygo engineered to prevent spillage, sticking or bridging. Standard sizes 3, 6, 8 and 10-foot dia.



Aerator

A patented Newaygo design, this high speed aerator blends, tempers, cools and aerates sand more thoroughly than is possible by any other method.

Full information and specifications on all Newaygo Foundry Equipment are contained in Bulletin No. 56. Send for your free copy.



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Circle 603 on Page 53

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Berlin Core Sand
Red Flint Annealing & Packing
New Jersey Molding
Gallia Red Molding
Albany Molding

BONDING CLAYS
*Volclay, MX-80 (Granular)
*and Panther Creek Bentonite
*Goose Lake Fire Clay
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*Certified Shot and Grit
*Blackhawk Sand Blast Sand
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loy," "Ultrasonic Attenuation in Cast Aluminum," "Effect of Molybdenum on Elevated Temperature Properties of Gray Iron," "How Aircraft Designers Look at Light Metal Castings," "Malleable Iron — A Magnetic Alloy," and "Some Properties of Wrought and Cast High-Strength Steel."

The Fundamental Papers Committee has scheduled a paper on "Dimensioning of Sand Casting Risers," while the Heat Transfer Committee will sponsor a discussion of "Modern Quenching Oils and Techniques for Heat Treating."

"Practical Planning for Nondestructive Testing by Use of Radiation" is one of the topics concerned with safety and hygiene.

In addition to paper presentations, discussion of practical operating problems will be conducted in five shop course sessions covering subjects related to sand, malleable iron, and gray iron.

Applications for hotel accommodations at Chicago have been sent to AFS members. Reservations at the Sherman, Morrison, Bismarck, and LaSalle hotels are being filled through the AFS Housing Bureau. Persons desiring rooms in any other hotels should make applications directly. Convention headquarters will be at the Sherman.

Lists Safety Recommendations For Grinding Wheel Operation

Discussion of the established rules governing maximum operating speeds has been prepared for the use of grinding wheel operators and others responsible for the control of grinding wheel speeds, by the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15.

The Safety Committee of the institute has published a new 24-page booklet, "Safety Recommendations for Grinding Wheel Operation." Subjects discussed include maximum peripheral speeds, strength classification of grinding wheels, definitions of maximum speeds, effect of wheel speed on grinding action, safety guards, mounted wheels, proper mounting procedures, and dos and don'ts for safe grinding. Copies of the booklet may be obtained at no charge from the Grinding Wheel Institute.

Will Discuss Teaching of Engineering Materials

To study how engineering materials can be taught better to engineering students, the American Society for Engineering Education and the American Society for Testing Materials jointly will sponsor a symposium on Education in Materials at the ASTM annual meeting to be held in Atlantic City, N. J., June 22-26.

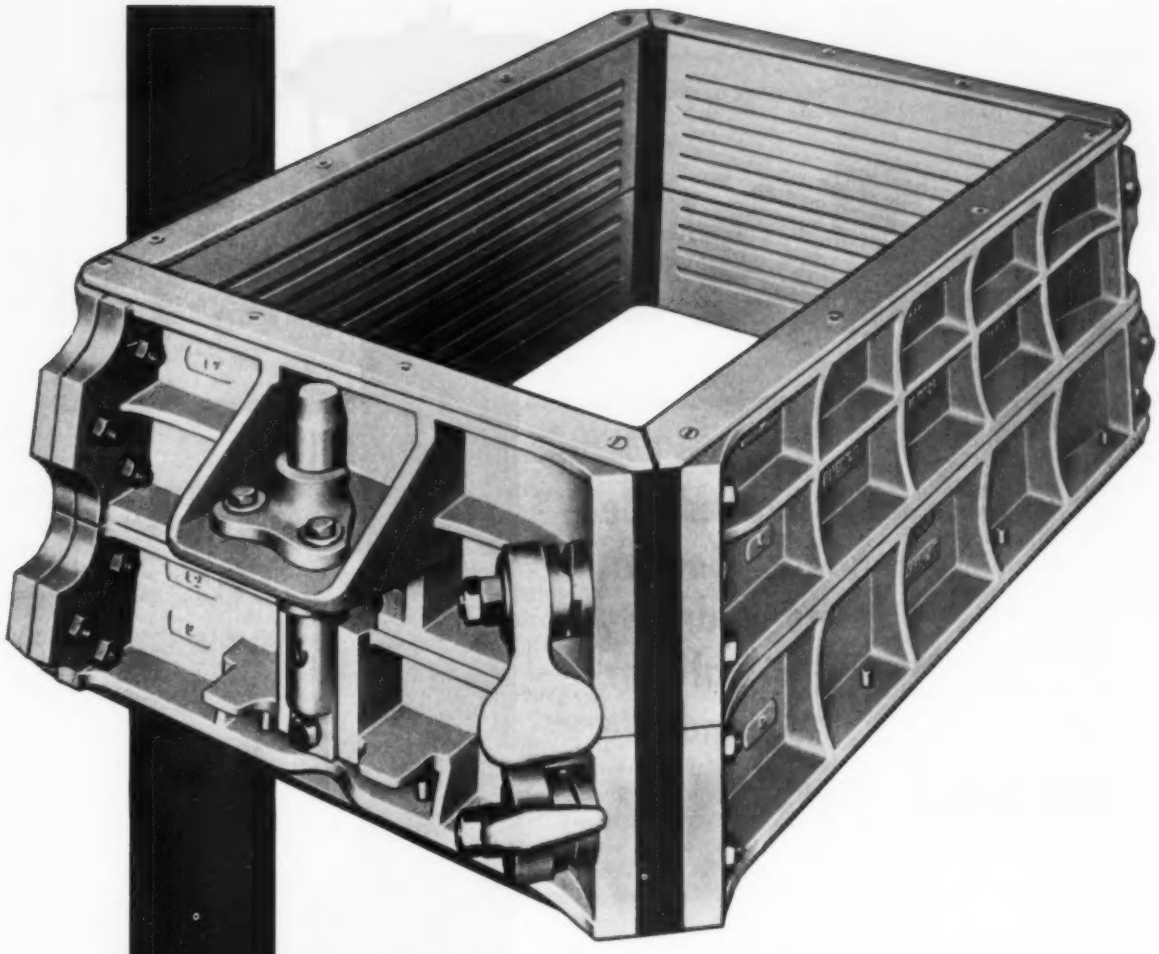
Scheduled tentatively for the first day of the meeting, the symposium will include an introductory paper by Prof. Kenneth B. Woods, ASTM president, and head of the School of Civil Engineering, Purdue University. The ASTM viewpoint will be presented by Frank L. LaQue, ASTM senior vice president and vice president and manager, Development and Research Div., International Nickel Co. Inc. Educators' viewpoint will be given by Dean William T. Alexander, ASEE president and Northeastern University. The symposium will be concluded by a summary or survey of projected degrees in materials engineering now being considered or initiated in many engineering schools.

Material Handling Institute Elects at Annual Meeting

Eugene Caldwell, general manager, Baker Industrial Trucks, division of Otis Elevator Co., Cleveland, was elected president of the Material Handling Institute Inc., at the recent annual meeting in New York. Other officers include C. L. Fell, vice president - marketing, American MonoRail Co., Cleveland, first vice president, and Robert F. Moody, sales manager, Domestic Industrial Truck Div., Hyster Co., Portland, Oreg., second vice president.

Furnace Orders Rise

Industrial Heating Equipment Association Inc., Washington, reports industrial furnace business in the last half of 1958 amounted to $26,535,000, an increase of 47 per cent over first-half 1958 orders of $17,798,000. Net new orders received in December totaled $4,284,000 compared with $3,992,000 in the 1957 month.



FREMONT'S SPREADLOCK FLASKS

This is a personal note from the manufacturer to inform you that these accurately machined flasks have tremendous corner strength. They are made of magnesium..... cams are hardened steel forgings. Spreadlock Flasks available in all convenient sizes.....

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Circle 605 on Page 53

Dependable East Jordan fire hydrants call for dependable HANNA PIG IRON

The Midwest Hydrant, developed by East Jordan Iron Works, is built to American Water Works Association specifications and is approved by Underwriters' Laboratories.

The lives and property of millions of people depend on the successful operation of fire protection equipment made by East Jordan Iron Works at East Jordan, Michigan. In business since 1883, East Jordan produces hydrants for the largest to the smallest municipalities in the Midwest.

Because of the importance of dependable fire protection equipment, hydrants and valves must be in "condition readiness" at all times. This requires an iron that will resist temperature extremes, oxidation and corrosive forces from contact with earthy materials. Only a metallurgically sound casting that will stand up under rigid pressure and toughness requirements can do the job. That's why the fine-grained, closely controlled structure and the uniform chemical analysis of Hanna Pig Iron make it ideal for such an application.

Hanna produces all regular grades of pig iron plus HANNATITE® and Hanna Silvery. All grades are available in 38-lb. pigs and the smaller HANNATEN® 12½-lb. ingots. For complete details about Hanna products, contact your Hanna representative.

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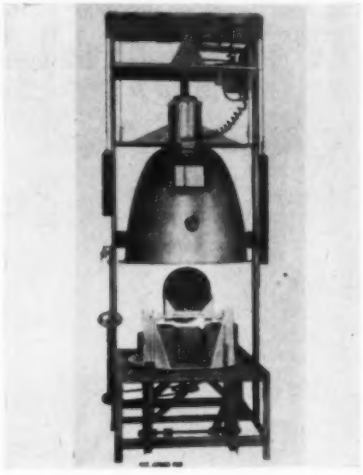
For More Information
Use Reply Card—Page 53

What's New in Equipment and Supplies

VACUUM INVESTING

Machine mixes and pours refractory slurries under vacuum for making investment molds. The operator observes mixing of the investment through a window. When the material is ready for pouring, he manipulates levers to control tilting of the mixing bowl and rotation of the turntable on which the flasks rest. The bowl has a capacity of 65 lb of investment, and the turntable holds up to sixteen 6-in. flasks. Use of the equipment is said to permit great freedom of gating. Molds are free of air bubbles and air pockets often encountered in certain mold cavity recesses and blind holes.—**Centrifugal Casting Supply Co.**, 147 W. 42nd St., New York 36, N. Y.



For More Details Circle No. 401—Page 53

EPOXY RESIN COMPOUND

Maraset carving resin 611 is a tough epoxy resin which cures at room temperatures and can be carved readily with standard hand tools. It is said to be superior to wood in dimensional stability and resistance to moisture and chemicals, and carving can be done without graining difficulties.

It can be handled either as a casting or splining material through the selection of alternative hardeners. Castings up to 2 in. thick can be produced, and its use as a splining compound permits quick, easy repair of wood models. The material adheres firmly to wood, metal, and other substances. It exhibits 2600 psi average tensile strength, 40 per cent elongation, and a 60-65 Durometer (Shore D) rating.—**Marblette Corp.**, 37-31 Thirtieth St., Long Island City 1, N. Y.

For More Details Circle No. 402—Page 53

BAGGED FERROALLOYS

Preweighed, bagged ferroalloys facilitate material handling and improve accuracy of alloy additions. Bags are delivered in crate-type pallets suitable for fork lift or crane handling, and desired alloy additions can be made conveniently and accurately by counting and adding the required number of bags.

Alloy additions available in this form include 50 per cent ferrosilicon, calcium-silicon, calcium-manganese-silicon, standard and medium carbon ferromanganese, and silicomanganese. — **Ohio Ferro-Alloys Corp.**, Canton, Ohio.

For More Details Circle No. 403—Page 53

REFRACTORY BRICK

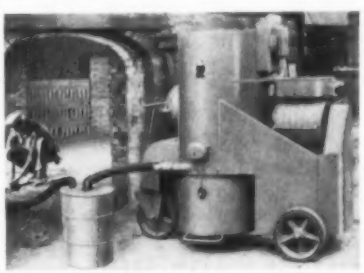
Multex-85 is a chemically bonded, high-alumina refractory brick specially developed for use in the aluminum industry. Its features include the following: 1. Molten aluminum will not wet it. 2. Silicon pickup is reduced remarkably. 3. The tendency of drosses and fluxes to adhere to sidewalls is reduced.

This brick has high strength and good spalling resistance and is recommended where operators of aluminum melting units prefer preformed brick. It is available in all standard sizes and shapes for immediate shipment. — **Refractories Div., H. K. Porter Co.**, Porter Bldg., Pittsburgh 19, Pa.

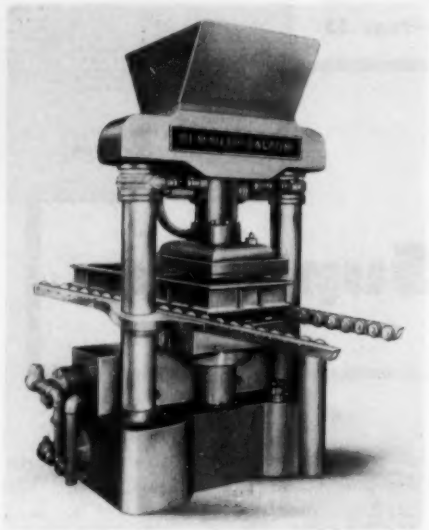
For More Details Circle No. 404—Page 53

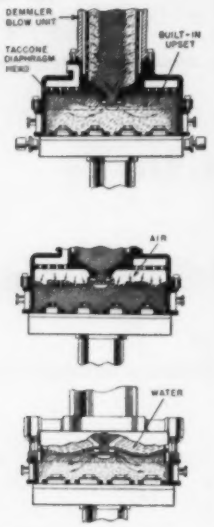
PNEUMATIC CONVEYOR

The Hoffco-Veyor is a portable pneumatic system for movement of a wide variety of dry materials and corrosive chemicals. Available in two standard models, these units are said to provide up to 80 per cent saving in labor cost and to increase efficiency by as much as 20 per cent.



They convey from 50 to 100 lb of material per minute, continuously or intermittently, as required. Where quantities exceed 7½ cu ft, standard 55-gal drums can be used as auxiliary collectors. The devices are equipped with inlet valves to





Molding Machine Blows, Squeezes, Strips

Molding machine combines three features: 1. Uniform flask filling. 2. Diaphragm principle of molding. 3. Drop-away stripping.

The "sand shooting" principle is used to fill the flask. Size of flask and character of the pattern determine the number and location of sand-shooting units as well as the method and location of venting. The diaphragm tank acts as an upset or chamber which receives the excessive sand header.

A flexible rubber diaphragm permits high pressures to be used to obtain uniform mold hardness throughout the entire mold, including vertical walls. When any part of the mold reaches a hardness great enough to resist the air pressure above the diaphragm, the diaphragm stops its movement in that area.

The stripping unit has controls that permit regulating the speed of the strip to meet the problems peculiar to individual castings.

The breakaway or the initial portion of the strip is slow, and the speed is increased as the mold clears the pattern. — **Demmler Mfg. Co.**, Kewanee, Ill., and **Taccone Pneumatic Foundry Equipment Corp.**, North East, Pa.

For More Details Circle No. 428—Page 53

take standard-sized 1½ to 2-in. vacuum hose and can be used as vacuum cleaners. They can be wheeled to any location in the plant.—**Dept. LL, U. S. Hoffman Machinery Corp.**, 103 Fourth Ave., New York 3, N. Y.

For More Details Circle No. 405—Page 53

FLEXIBLE PLASTIC STEEL

Devcon Flex is a new product which is mixed with the company's Plastic Steel to produce a part that will stand up to sledgehammer pounding without breaking. It is designed for any applications where the strength of metal must be combined with the flexibility of rubber.

Based on specially modified thermosetting plastic materials, Plastic Steel, once hard, can be drilled, ground, or otherwise modified. It will bond iron, steel, bronze, aluminum, glass, wood, and many other materials to themselves or to each other. The addition of Flex greatly increases its adhesive qualities, even under considerable temperature changes.—**Devcon Corp.**, Danvers, Mass.

For More Details Circle No. 406—Page 53

CYCLONE DUST COLLECTOR

High-efficiency cyclone separator which operates in the 2000-3000 cfm range is designed to handle large volumes of bulky dust. Its self-cleaning radial fan design is claimed to give high performance at low horsepower requirements. The unit is designed for outside exhaust, but models equipped with cloth after-filter bags are available if it is desired to save heat and to recirculate cleaned air.

In laboratory tests, the manufacturer states, the new cyclone has separated, by weight, 99.8 per cent of steel grindings, 99.5 per cent of sawdust, and 84 per cent of fine corn starch particles. It is operated by a 7½-hp motor and has a 10-in. inlet and a 12-in. outlet.—**Dept. KP, Torit Mfg. Co.**, Walnut & Exchange Sts., St. Paul, Minn.

For More Details Circle No. 407—Page 53

POT CRUCIBLE FURNACE

Versatility as a pot, crucible, and retort furnace makes this unit suitable for a variety of laboratory and pilot plant operations. Designed for heat levels up to 2000° F, the furnace has a chamber 8 in. in diam by 9 in. deep. Dimensions

of the alloy pot are 6 in. ID by 1½ in. deep. The atmosphere retort has a working area of 6 in. ID by 8¼ in. deep. Furnace is supplied with transformer, heating element, contactor, thermocouple, and chamber cover.—**Lindberg Engineering Co., Pilot Plant Equipment Div.**, 2444 W. Hubbard St., Chicago 12, Ill.

For More Details Circle No. 408—Page 53

FLUORESCENT LAMPS

Improved Power-Groove fluorescent lamp is said to produce 15 per cent more light, but to consume only 7 per cent more power than previous models. The increase in light output is achieved by a rede-

Cedar Heights superior plastic bonding agents from the world's finest clay deposits hold moisture . . . help produce smooth, clean, undamaged molds with high green strength in less mulling time.

Cedar Heights clays dry out strong with a minimum of shrinkage . . . have a high refractory value to resist erosion, washing and blows.

Result: cleaner, finer finish castings produced in less time with fewer rejects.

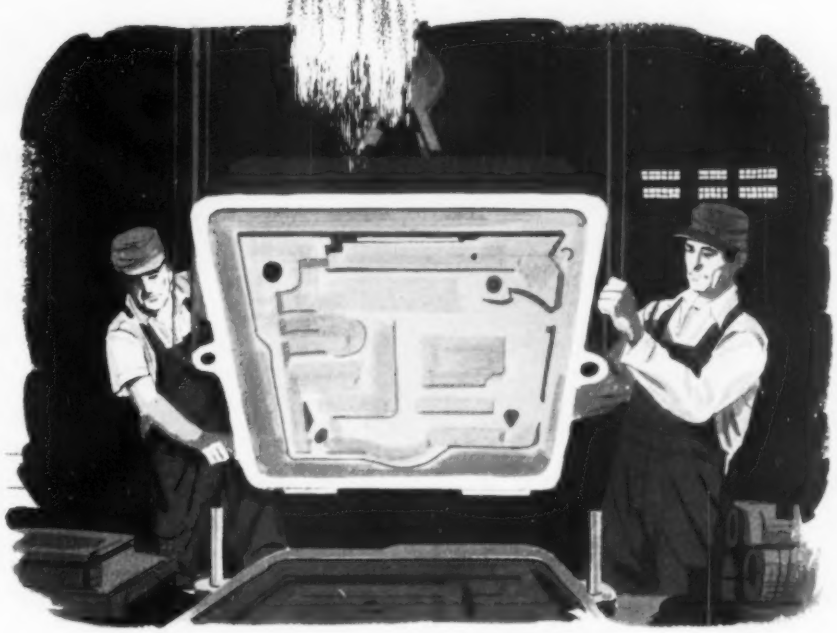
Contact your distributor for Cedar Heights Clay products or write for free test samples.

CEDAR HEIGHTS BONDING CLAY
A plastic bonding agent produced in No. 8, 12, 16, 20, 30 and 50 meshes.

higher strength . . . better molds

CEDAR HEIGHTS AIRFLOATED CLAY
Highly refined, artificially dried. Ground to 200 mesh.

CEDAR HEIGHTS FIRE CLAY
High in refractory value, smooth clean texture. Produced in No. 8, 12, 16, and 20 meshes.



CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

Circle 607 on Page 53

SIMONDS
ABRASIVE CO.

DOUBLE XX

Reinforced Resinoid depressed center wheels for *Fastest grinding* . . . . .

for all portable disc sanders and right angle type grinders

For grinding all kinds of steel, fabricated parts, castings, etc.—weld grinding, deburring, roughing, finishing.

CALL YOUR SIMONDS DISTRIBUTOR

Proven products
Dependable know-how
Quick supply

With lightweight, rigid-type Double XX wheels you "head" into the work at about a 30° angle . . . literally cutting metal away—a much faster method than grinding it down. Made from fast-cutting aluminum oxide abrasive, strongly bonded with synthetic resins and *doubly* reinforced for extra strength and safety. Use with mounting adaptor. No backing pad required. Available with 7″ and 9″ diameters, 3/16″ and 1/4″ thicknesses. Order from your Simonds distributor.

SIMONDS ABRASIVE COMPANY

Tacony & Tradey Sts., Philadelphia 37, Pa.

DIVISION OF SIMONDS SAW AND STEEL CO.

BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND • ORE. • SAN FRANCISCO • SHREVEPORT

Circle 608 on Page 53

sign which involves grooves along opposite sides of the tube rather than along only one side. An 8-ft tube produces 70 lumens per

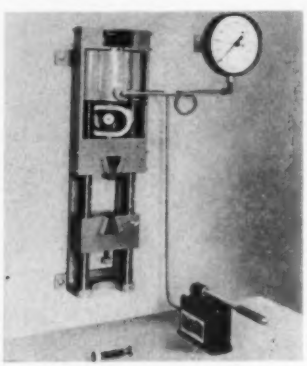
watt. This size will be produced first and will be followed by 4 and 6-ft lengths. The new lamp also is 25 per cent lighter than earlier Power-Groove models. Life is 7000 hours.—**General Electric Co.**, Nela Park, Cleveland 12, Ohio.

For More Details Circle No. 409—Page 53

WALL-MOUNTED TESTER

To save bench space, tensile tester is made so that hydraulic cylinder and jaw units and 8½-in. gage can be mounted on wall. Tests can be made on flat or round specimens with enough accuracy for laboratory use, yet simply enough for production use.

Test specimens are gripped by hardened, ground jaws of wedge type. Initial gripping force is ap-



plied by manually tightening adjusting screws. As pressure for the test builds up, the wedge shape of the jaws increases the holding force. The stationary jaw holder can be adjusted for specimens from 5 to 13 in. long. It is held in place by half-rings and grooves and is located by a nonload-carrying lock screw.

Breaking or yield point is indicated by a maximum-pointer hand carried along by the pressure hand on the gage. Models are available with capacities to 40,000 lb.—**Steel City Testing Machines Inc.**, 8817 Lyndon Ave., Detroit 38, Mich.

For More Details Circle No. 410—Page 53

SAND CONDITIONER BELTS

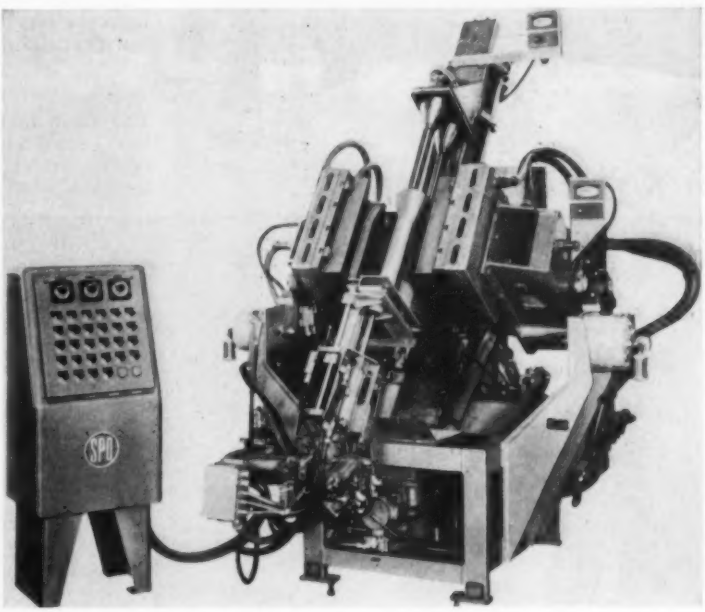
Rubber-studded belt for belt-type sand conditioners and blenders is said to be highly flexible and abrasive and shock resistant. Clay and binders do not build up on the belt because the rubber studs flex and distort as they pass around pulleys. Because the belt is rubber reinforced with three-ply cotton duck, pulleys can be crowned to prevent wandering from side to side.

Resilience of the studs makes tramp iron and core butts bounce to the cleaning gate for expulsion. Sand is said to be blended, aerated, and fluffed into an open mass for superior molding.—**National Industrial Supplies Co.**, Dayton, Ohio.

For More Details Circle No. 411—Page 53

EXOTHERMIC FERROALLOYS

Company has added three new exothermic ferroalloys to the Vancoram product line, bringing the total number available to five: Thermokrom, exothermic ferrochromium; Thermosil, exothermic ferrosilicon; Thermokromsil, exothermic ferrochrome - silicon; Thermovan, exothermic ferrovanadium; and



Mandrel Attachment Improves Shell Cores

Fully automatic core mandrel attachment for optional use on the company's Model SC-30 shell core machine is said to provide close control of core wall thickness and exceptional uniformity of cure. The attachment consists of one or more internally heated mandrels plus operating mechanism and controls. Each mandrel is heated by a 110-v, 1500-w element and is individually thermostatically controlled.

The shell core machine offers fast, low-cost output of hollow cores in a wide range of sizes and types. When operating automatically with a mandrel attachment, it closes coreboxes, blows and cures cores, withdraws mandrels, opens coreboxes, and deposits finished cores on a delivery belt. It can blow solid cores up to 30 lb and accommodates coreboxes from 3 to 9 in. thick, 1 to 16 in. deep, and 5 to 21 in. high, on gas-fired ovens.—**SPO Inc.**, 6448 Grand Division Ave., Cleveland 25, Ohio.

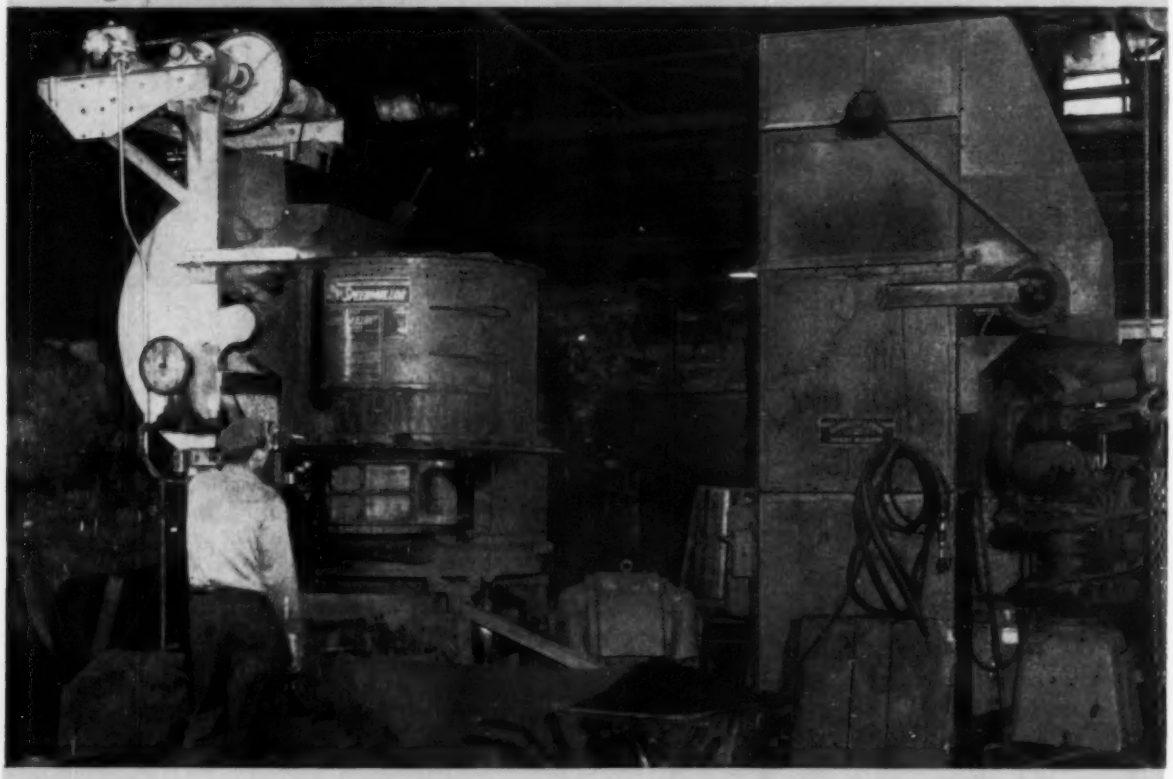
For More Details Circle No. 429—Page 53

ONLY SPEEDMULLOR ECONOMY CAN SATISFY SMALL FOUNDRY BUDGETS*

...installed, operated and maintained for less!

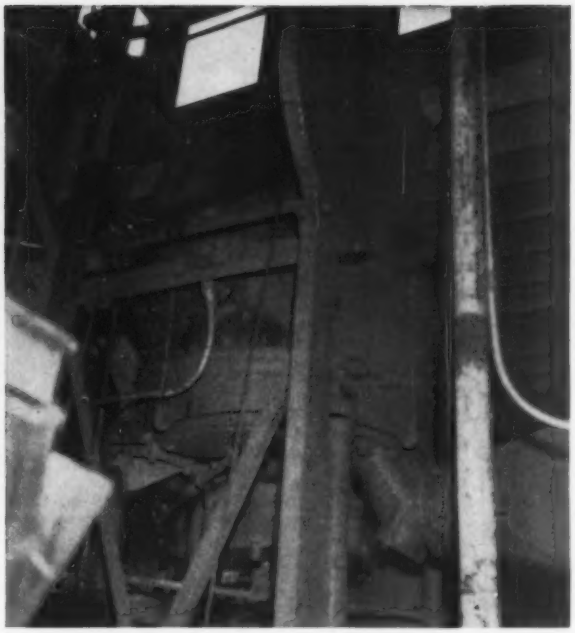
SPEEDMULLORS are the choice of budget-minded small foundries . . . both ferrous and non-ferrous. Expensive external equipment for cooling or aerating is not required, and Speedmullor thoroughness consistently reduces material costs. High powered—*yes*—but power is used so effectively and for such short mulling cycles that power cost *per ton of sand mulled* is far lower. With rubber to rubber mulling and light weight moving parts, Speedmullors set new low-cost maintenance standards.

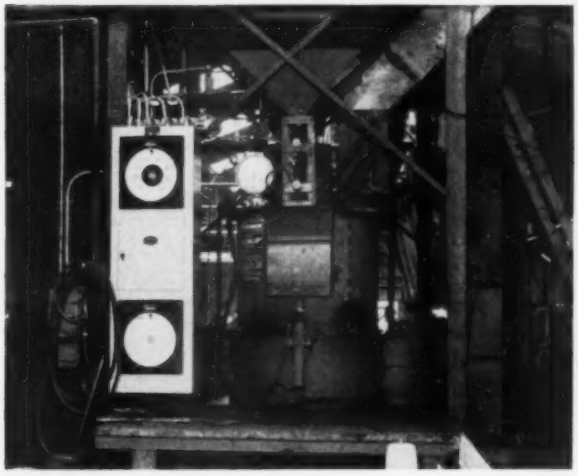
The small budget-minded **ANSTEY FOUNDRY** (below) installed a Speedmullor, because it was the only muller that could provide necessary capacity and quality and still keep costs in line.



*P.S. BIG FOUNDRIES HAVE BUDGETS, TOO!

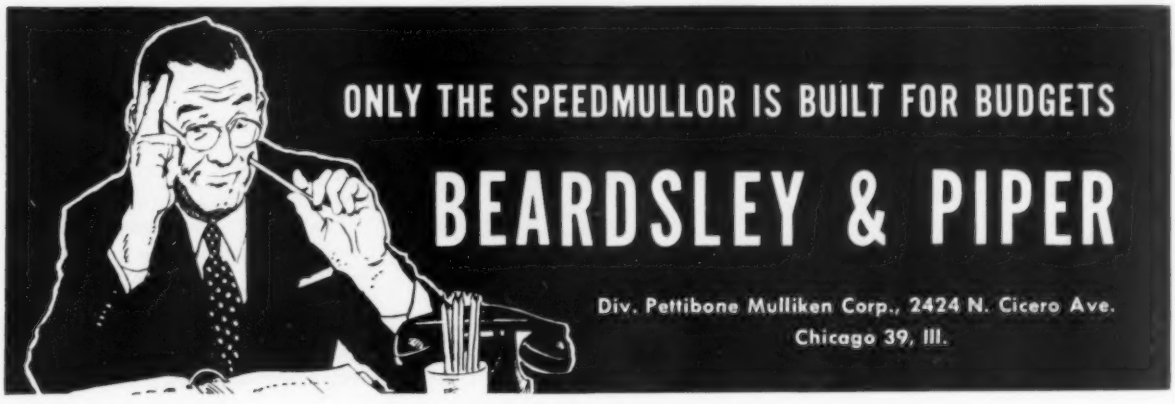
GLAUBER VALVE CO.—A small, high production brass shop—needed a muller that would provide a high capacity of sand mulled to exacting specification in a completely automatic set-up. The Speedmullor with Mulltrolmatic was the answer . . . it provided the essential features . . . productivity, compactness, thoroughness *and economy*.





WORTH MFG. CO.—Small Texas aluminum production shop chose a Speedmullor for the same reasons. Investigation proved to management that only the Speedmullor provided the capacity, compact size, efficiency and economy needed. This budget-minded foundry couldn't afford to compromise on "second-best."

WAUSEON FOUNDRY—Small Ohio gray iron shop competing with the best-equipped foundries in the country—chose Speedmullor, too. Again the reasons were the same . . . high production, superior efficiency *and economy*. This cost-conscious foundry couldn't afford a "wrong choice."



Circle 609 on Page 53

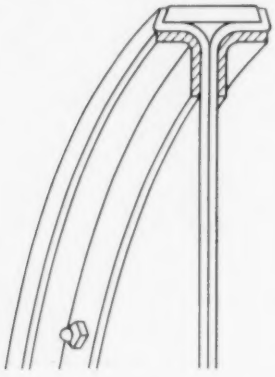
Thermocol, exothermic ferrocolumbium.

The exothermicity of these alloys permits addition of alloy content to hot metal without chilling effect. This series of alloys can be used in almost all types of alloy steels and irons. Exothermic ferrocolumbium and ferrovanadium also can be used for small additions to ferrous metals for beneficial effects on grain size. All are packed in sealed steel cans with a uniform, preweighed content. Cans are palletized for convenient and economical storage and handling. — **Vanadium Corp. of America**, 420 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 412—Page 53

REINFORCED WHEELS

Rims of heavy-duty wheels to be used on band saws and band resaws are reinforced with a double thickness of steel to make them five times stronger. They are said to be



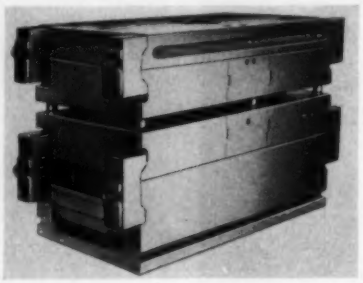
ideal for use on resawing operations, on very thick work, or on any other work requiring extreme blade tension. Dynamic balancing permits vibrationless operation at high speeds.—**Carter Products Co.**, 50 Market St. N.W., Grand Rapids, Mich.

For More Details Circle No. 413—Page 53

DIECASTING DIE ASSEMBLIES

Standard-unit die assemblies for zinc and aluminum diecasting enable diecasters to replace cavities at minimum cost in minutes. Three sides of the die are open for easy installation of cores or coolant lines. The twin replacement units are standard 9⅞ x 11⅞ in. to assure availability of cavity plates from stock.

The unit dieholder includes a watercooled sprue bushing, sprue spreader, leader pins, and wedge clamps. Rack-and-pinion or bumper-type ejector box assembly is op-



tional. The set of matched replacement units is delivered with leader and return pins and the ejector plates installed.—**Detroit Mold Engineering Co.**, 6686 E. McNichols Rd., Detroit 12, Mich.

For More Details Circle No. 414—Page 53

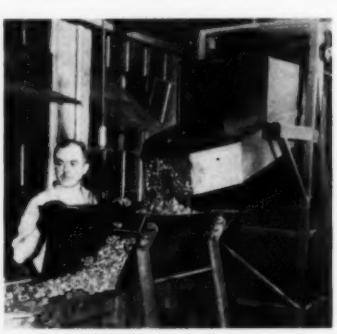
VACUUM CLEANER

Heavy-duty vacuum cleaner attaches to any standard, openhead, 55-gal drum to give a full pickup capacity of 48 gal of dry material or 40 gal of wet material. It is powered by a 1¼-hp motor, sealed against dirt and water, which drives a two-stage, turbine-type centrifugal fan. The unit can be fitted with any of the company's complete line of attachments for large-capacity vacuuming. An accessory dolly speeds emptying and provides convenient mobility.—**Black & Decker Co.**, Towson 4, Md.

For More Details Circle No. 415—Page 53

MATERIAL HANDLING

Cesco Dumper is used to lift and dump small metal parts on a con-



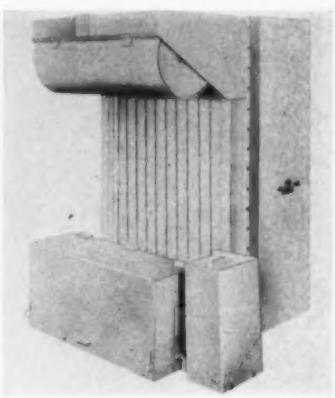
veyor belt prior to inspection and sorting. Material containers are placed easily in the dumper, whether stationary or mobile, by hand or by fork truck. Electrically or hydraulically powered, they offer pushbutton control which gives positive action. The material container can be stopped anywhere along its route of travel.—**Essex Conveyors Inc.**, 165 Franklin Ave., Nutley 10, N. J.

For More Details Circle No. 416—Page 53

AUTOMATIC FILTER

Type B Rollotron is a new design of the company's basic Rollotron agglomerator-filter principle. It is said to combine the efficiency of an electronic precipitator with the low maintenance of an automatic, renewable media filter.

Dry electrostatically charged plates are used to agglomerate atmospheric contaminants. The agglomerated particles, including submicron sizes, are held together by intermolecular attraction until they are picked up by the air stream and



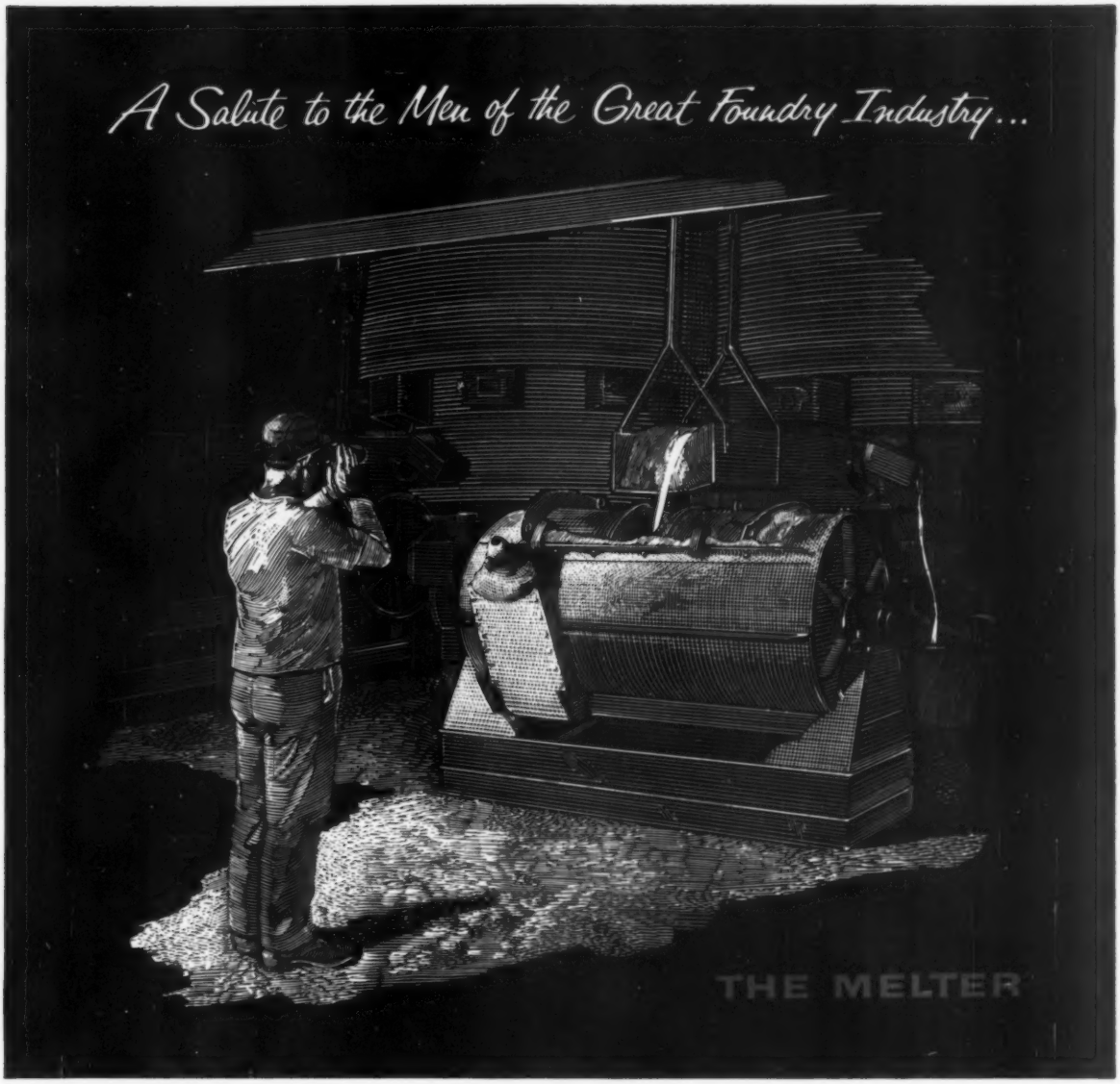
deposited in the renewable media of the storage section. There, accumulated dirt is wound automatically into a compact roll for easy disposal. Resistance to air flow is uniform and constant. — **Department PD, American Air Filter Co.**, 215 Central Ave., Louisville 8, Ky.

For More Details Circle No. 417—Page 53

VENTURI TORCH BURNER

Company's Hi-Lo venturi torch burner offers 10-to-1 turndown with low-pressure gas. Control is by a single valve, and no air blower is required. The torch is a wide-range modulating burner with no flashback and no sacrifice of flame stability throughout the heat range. Torches are offered in capacities from 120,000 to 1,800,000 Btu per hr in the low-pressure series and from 200,000 to 9,300,000 in the medium-pressure series.—**Bryant In-**

A Salute to the Men of the Great Foundry Industry...

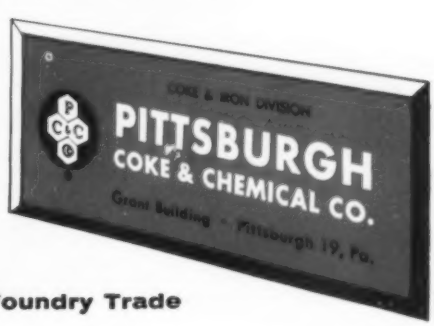


THE skill and experience of the foundry Melter are a vital part of every gray iron casting. For it is his responsibility to control the performance of the cupola to precisely meet predetermined metallurgical specifications.

From the accurate weighing and charging of materials in the cupola . . . to the careful control of such factors as coke bed depth, temperature and blast pressure, the Melter must exhibit the special skill and judgment of his unique craft.

Pittsburgh Coke & Chemical is proud to salute the gray iron foundry melter. It is equally proud to serve as a basic supplier of two quality products for the nation's foundry trade . . . NEVILLE PIG IRON and NEVILLE FOUNDRY COKE.

An enlarged (11½" x 11") reproduction of the above etching, suitable for framing, will be sent without cost upon request. Reproduction of etchings from the first advertisements of this series, featuring the Pattern Maker and Molder, are also available.



Neville Pig Iron and Neville Coke for the Foundry Trade

WSW 7469

PIG IRON • COKE • FERROMANGANESE • CEMENT • COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON

Circle 610 on Page 53

404 hours of sandblasting

Only 1/32 of an inch change in this nozzle diameter!

And it's typical of NORBIDE* Pressure Blast Nozzles

Hundreds of hours of useful life remain in the Norton NORBIDE Pressure Blast Nozzle shown in use above. Matter of fact, its *guaranteed minimum service life* with silica sand is 750 hours . . . with steel shot or grit 1500 hours! And this means that it will maintain a concentrated stream contour and high efficiency abrasive velocity *throughout* its life span.

The reason that NORBIDE Nozzles perform *efficiently* up to 200 times longer than cast iron nozzles is simple. They're lined with light, tough Norton Boron Carbide — the compound that's only exceeded in hardness by the diamond. It's today's hardest man-made, molded material with an almost unbelievable resistance to wear.

NORBIDE nozzles sharply reduce — by 10% to 20% — the wasteful consumption of compressed air . . . all too frequently neglected in considering the overall cost of pressure blasting.

You can clean all sizes of castings, faster and more economically with Norton NORBIDE Pressure Blast Nozzles. They're available with bores from ⅛" to ⅞"; lengths up to 6". For complete details write NORTON COMPANY, Refractories Division, 302 New Bond Street, Worcester 6, Massachusetts.

NORTON PRODUCTS Abrasives
Grinding Wheels • Grinding Machines
Refractories • Electrochemicals
BEHR-MANNING DIVISION Coated Abrasives
Sharpening Stones • Pressure-Sensitive Tapes

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
Engineered . . . Rx . . . Prescribed

Making better products . . . to make your products better

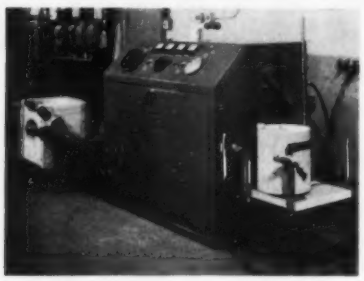
Circle 611 on Page 53

dustrial Products Corp., 17700 Miles Ave., Cleveland 28, Ohio.

For More Details Circle No. 418—Page 53

INDUCTION FURNACE POWER

A console panel contains power source, controls, and other components necessary to operation of high-frequency induction furnaces and coils. The unit features a 30-kw motor-generator set; a compact,



efficient high-frequency transformer; and all necessary capacitors, meters, and controls. The equipment is installed by connecting it to a 220 or 440-v power supply, a cold water line, and a drain. Furnaces or coils are connected to the unit by leads which supply both power and cooling water.—**Inductotherm Corp.**, 412 Illinois Ave., Delanco, N. J.

For More Details Circle No. 419—Page 53

RESPIRATOR FILTER

Variable-density Red Devil respirator filter has Bureau of Mines approval for respiratory protection against all dust not significantly

more toxic than lead, pneumoconiosis-producing and nuisance mist, and chromic acid mist. It is composed of two sections, a red prefilter and the filter body.

The built-in prefilter is made of interlocked viscose fibers and is thermally bonded to the filter body. The latter consists of a combination of microfine viscose and vinyon fibers and ultrafine asbestos fibers. Construction is such that filtering efficiency increases from front to back, preventing rapid plugging. The filter is made to fit the company's standard single and twin-cartridge respirators. — **American Optical Co.**, Southbridge, Mass.

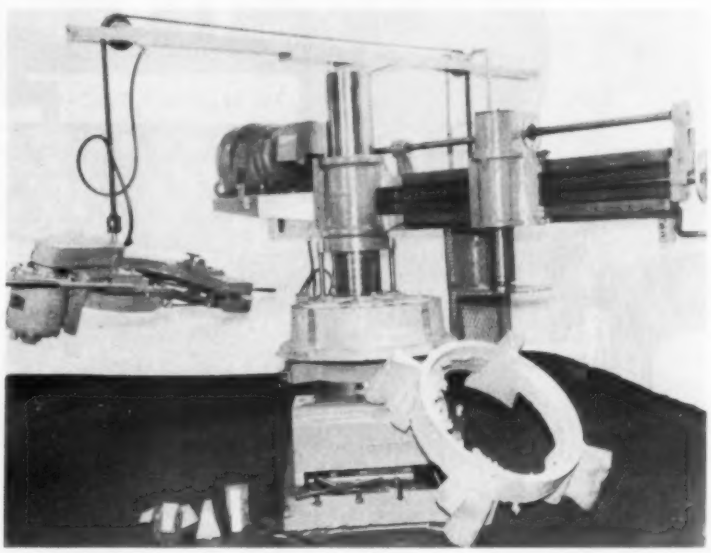
For More Details Circle No. 420—Page 53

TURBO-PRESSURE BLOWERS

Series of turbo-pressure blowers is designed for the quietest possible operation. They feature aluminum alloy wheels which provide strength and toughness at the same time that the light weight increases bearing life. Housing of the units can

be moved to any position to furnish virtually universal discharge adjustment.

These blowers are reported to provide constant pressure with vary-



Combines Bandsaw and Cutoff Machines

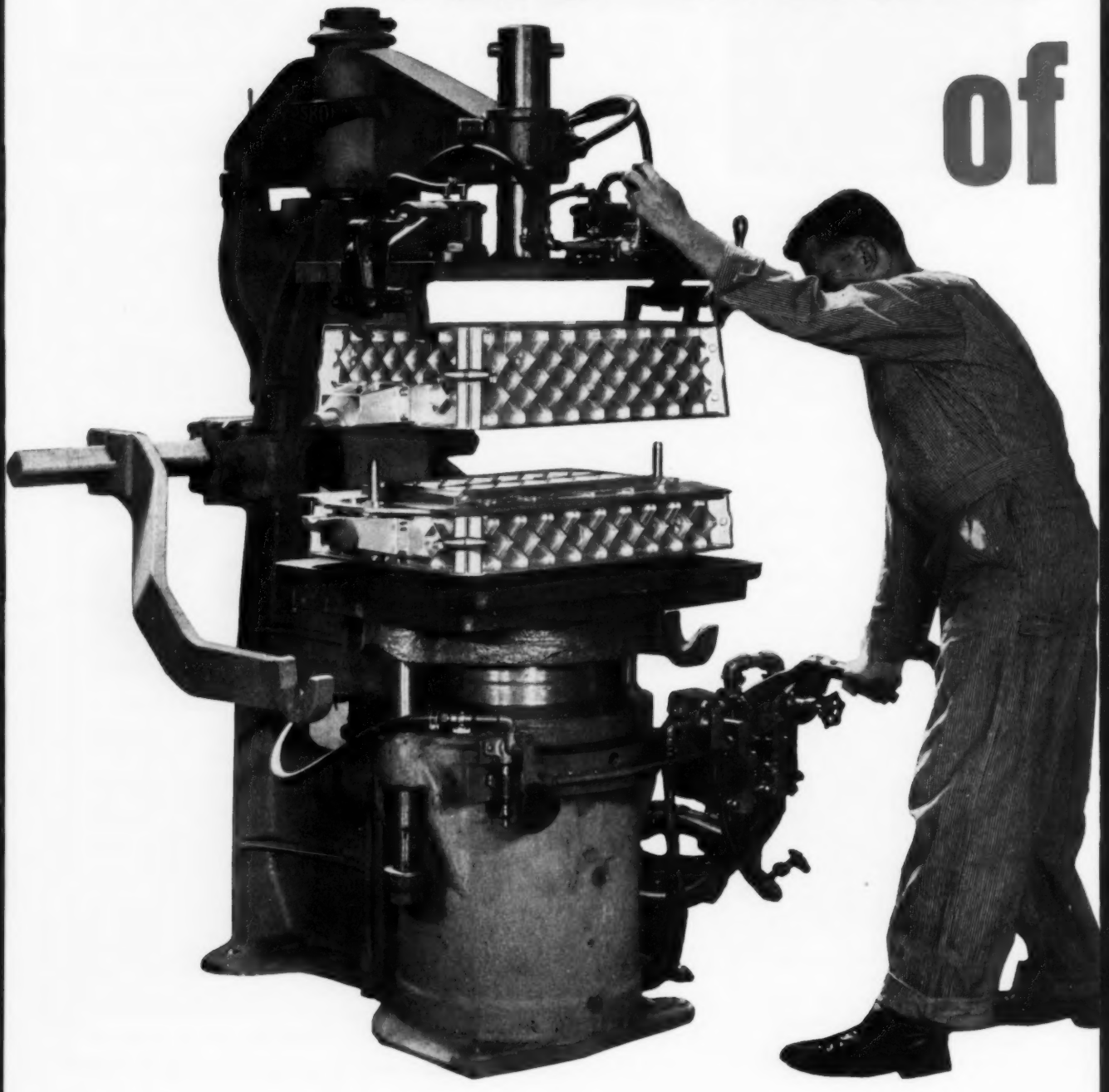
Floating bandsaw operates in conjunction with a standard cutoff machine. The combination is said to offer fast, accurate cutting on all surfaces. The bandsaw is particularly useful in the removal of gates from large nonferrous castings. It is counterbalanced for ease of operation. The saw is moved to the work and passes through it in a vertical plane. Its flexibility permits sawing of angle or contoured surfaces while the work rests on the floor or on the other machine.

The radial-type cutoff machine uses either carbide-tipped circular saws or flush-mounted grinding wheels, depending on the material to be cut. It features large work capacity and is readily adaptable to automation for high production.

Either of these two machines can be used independently as well as in conjunction with the other.—**Acme Saw & Mfg. Co.**, 1447 E. 47th St., Cleveland 3, Ohio.

For More Details Circle No. 430—Page 53

To the who wants of



MOLDING MACHINES

Foundryman a bigger share the business

OSBORN ROTA-LIFT® keeps your quotes competitive . . .
helps you handle a wider range of jobs . . . at a profit

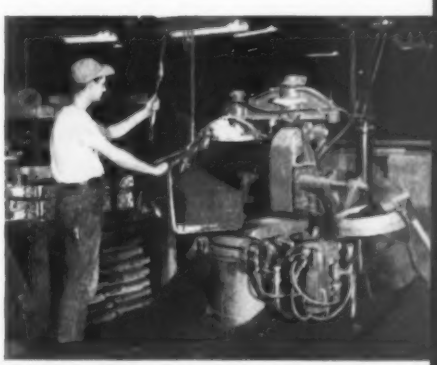
Molding from large match-plate patterns today with an Osborn *Rota-Lift®* means a *mechanized* operation that pays off in better castings . . . at lower cost.

One man . . . one *Rota-Lift* machine easily handle all five major match-plate molding operations—jolt . . . roll . . . squeeze . . . draw . . . and close. Able to handle a wide range of flask sizes, *Rota-Lift* machines are also quickly adjustable for rapid short-run job changeovers.

The *Rota-Lift* is ideally suited and a real asset to any jobbing or semi-production foundry. An Osborn Sales-Engineer will recommend the right model *Rota-Lift* to improve your competitive position . . . for a *bigger* share of the business now. Call him in—or write: *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

WRITE FOR YOUR COPY of *Rota-Lift* folder No. 25-A. Includes complete specifications, operating data, applications and design features on the Osborn *Rota-Lift* molding machine line.

OSBORN ROTA-LIFT producing under overhead sand hopper and telescopic conveyor for mold set-off.



OSBORN ROTA-LIFT producing with floor sand and jib-crane for mold set-off.

FEMA *leader in mechanization for the foundry* OSBORN®

CORE BLOWERS • SHELL MOLDING MACHINES • BRUSHING MACHINES • INDUSTRIAL BRUSHES

Circle 612 on Page 53

ing air volumes and to show a highly efficient power consumption curve. They supply more than 2000 cfm of air at 20 kw. Sizes available range from 1/3 to 50 hp units capable of delivering from 125 to 5250 cfm of air at pressures from 4 to 28 oz per square inch.—**Chicago Blower Corp.**, 9856 Pacific Ave., Franklin Park, Ill.

For More Details Circle No. 421—Page 53

LIGHTWEIGHT TROLLEY HOIST

Aluminum Army-type trolley hoist with capacities up to 2 tons features one-man installation and permanently sealed-in lubrication.

Manufacturer says it requires less headroom than other hoists of its type and is readily adaptable to a wide range of standard I-beams and monorail systems. It also can be converted to a geared trolley unit.

Body of the hoist is aluminum alloy, and pinions and gears are Cr-Ni-Mo alloy steel. The heavy-duty precision ball bearings are presealed. **Philadelphia Hoist Div.**, 340 N. Hamilton St., Doylestown, Pa.

For More Details Circle No. 422—Page 53

FRONT-END LOADER

The company's rear-wheel drive, front-wheel steer Model Hf Payloader is being replaced by the new H-30R model. The latter has a carry-capacity of 3000 lb at average operating speeds and also is a rear-wheel drive, front-wheel steer machine. Buckets from 2/3 to 2 cu yd are offered for handling of various materials within the rated capacity, and a variety of attachments is available.

Bucket action of the new unit provides 40-degree tipback. Torque converter has a 2.6 to 1 stall ratio and a four-speed, full-reversing, manually shifted transmission. It is powered by a 6-cylinder Hercules gasoline engine which develops 66.5 hp at 2200 rpm. Optional equipment includes double-acting cylinders for downpressure, a steering-booster attachment, and special buckets. — **Frank G. Hough Co.**, 703 Seventh Ave., Libertyville, Ill.

For More Details Circle No. 423—Page 53

FURNACE BRICK

Medal P-4 is a dense, hard-burned furnace brick for use where contact with molten metal and slag require high resistance. It also is reported to be adaptable for use where excessive temperatures and increased volume stability are needed. Medal P-4 is recommended for hot metal mixer linings, sidewalls and bottoms of air furnaces, and for similar applications.

Laboratory test results in accordance with ASTM testing procedures are said to show approximately 1 per cent maximum hot load deformation at 2640° F and porosity ranges from 10 to 12 per cent with a pyrometric cone equivalent of 33-34.—**J. H. France Refractories Co.**, Snow Shoe, Pa.

For More Details Circle No. 424—Page 53

TESTING AND SORTING UNIT

Model C-2 Cyclograph makes possible quick nondestructive testing and sorting of accidentally mixed or incorrectly processed metal parts. It can be used on either ferrous or nonferrous metals and will sort raw stock or semifinished or finished parts by such metallurgical characteristics as analysis, hardness, structure, case depth, etc. Size and shape of part present no particular problem. If the unit is used in conjunction with an automatic relay unit, the combination permits fully automatic, high-speed inspection.—**J. W. Dice Co.**, Englewood, N. J.

For More Details Circle No. 425—Page 53

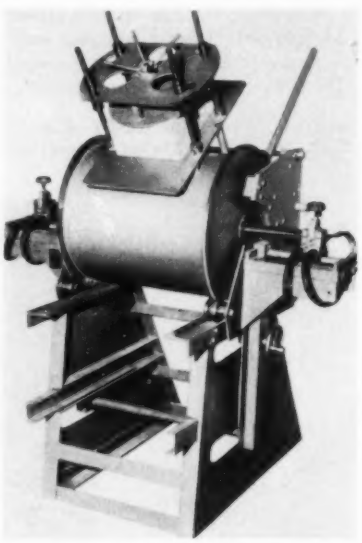
TRAMP IRON SEPARATORS

Tramp iron separators feature the use of Indox ceramic permanent magnets. The ceramic material is barium ferrite pressed into a compact under great pressure and permanently magnetized to produce an ideal flux pattern for maximum effective operation. An Indox V magnetic pulley is installed at the head of a belt conveyor system. A grate magnet is installed in floor or hopper opening, chute, or duct to guard against tramp iron. A magnetic drum is designed for industries where granular materials are conveyed in enclosed chutes and spouts. A revolving stainless steel cylinder inside the housing carries material over the stationary magnet assembly. Tramp iron particles are held beyond the discharge of nonmagnetic products. Indox V plate magnets also are available to trap iron particles in flowing material.—**Stearns Magnetic Products**, 635 S. 28th St., Milwaukee 46, Wis.

For More Details Circle No. 426—Page 53

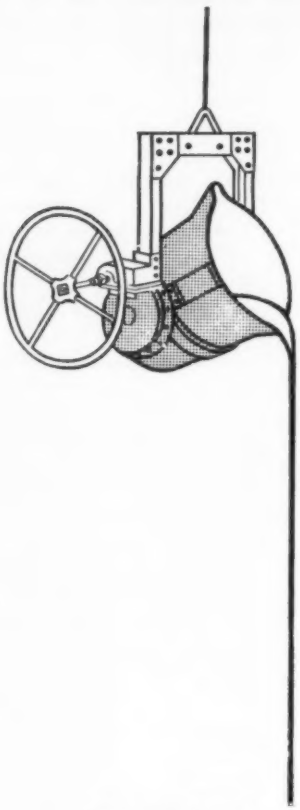
INDIRECT ARC FURNACE

Barrel-type, 60-lb capacity, indirect arc furnace for use by investment casting foundries features a dump-over arrangement with mold clamp attachment. Furnace barrel rides on ball bearing rollers and can be tipped 180 degrees. The clamp attachment can be removed to permit lip pouring into ladles or molds. Primary current input is 220/440 v, single phase, 60 cycle, 39 kva, 400 amp. Watercooled carbon electrodes are kept in centered position by a lead screw device which moves the electrodes together or apart simultaneously.—**British Machine & Foundry Supplies Ltd. Div., British Industries Corp.**, Port Washington, N. Y.



For More Details Circle No. 427—Page 53

FOUNDRY EXHIBITION



BINGLEY HALL
BIRMINGHAM
ENGLAND

MAY 21-30, 1959

British foundry machinery and supplies are in service in every country in the world where metals are cast. They exemplify in fullest measure the advanced design, technical achievement and unfailing reliability of British engineering and allied products.

In May next, foundrymen from all parts of the world will have the opportunity of studying all the most modern developments in foundry equipment and practice *at one time and in one place*. Nearly one hundred of the leading firms specializing in this field will occupy some 80,000 square feet at the first Exhibition for many years to be exclusively devoted to the British foundry industry. It will be held at the Bingley Hall in Birmingham, in the industrial heart of England, from May 21st to 30th 1959.

New designs, new processes, and new materials will be on display; experts in every branch of foundry practice will be in attendance on the stands to welcome visitors and give them all possible information and assistance. No foundryman who is seeking ways and means of increasing productivity, improving quality and eliminating waste—and who is not?—can afford to miss this unique opportunity of seeing all that is best in foundry engineering achievement.

Let it be remembered, too, that the British countryside is never lovelier than in May!

Bingley Hall is in the centre of Birmingham, close to the main railway stations from which fast trains run to all parts of the United Kingdom, and with easy access to the airport • Admission to the Exhibition will be by ticket or by trade card presented at the Hall • The Exhibition will be open from 10 a.m. to 6 p.m. (except Sunday) • All enquiries regarding admission, accomodation, travel etc. should be addressed to the Organizers who will give all possible assistance.

Address your enquiries regarding the 1959 Foundry Exhibition to—

THE ORGANIZERS, HERBERT DANIEL EXHIBITIONS LIMITED
3 Clifford Street, London W.1, England
Telephone: Regent 8611

Circle 613 on Page 53

Industry Briefs

● **WILLIAM H. NICHOLLS CO.**, Richmond Hill, Long Island, N. Y., has been sold to Taccone Pneumatic Equipment Corp., North East, Pa. Nicholls, which has made molding machines for more than 50 years, will retain the same name and location. President William H. Nicholls Jr. will be active in the business and will serve as a director of the new corporation. Taccone makes equipment for various industries, including foundry molding machines.

American MonoRail Co., Cleveland, Ohio, plans to purchase the plant of the former Geometric Stamping Co., Euclid, Ohio, for $600,000. The building contains about 130,000 sq ft of space and is on a 7-acre plot at 1111 E. 200th St., Euclid. American MonoRail expects to relocate its operations in the new plant by midyear and to spend about $150,000 for the move and improvements to the Euclid plant.

Milwaukee Solvay Coke Co. is installing new crusher, conveyor, and screening equipment at its Milwaukee plant. The equipment will double-screen the coke, providing more effective means for producing narrow limits in size make-up.

Milwaukee Solvay foundry coke is sold by Pickands Mather & Co.

Stoffel Equipment Co., 5300 N. Sherman Blvd., Milwaukee, has been appointed to represent M-H Equipment Co. in Wisconsin.

Milwaukee Faucets Inc., Milwaukee, has purchased the former quarters of Caterpillar Tractor Co.'s Milwaukee engineering department at 4250 N. 124th St., Wauwatosa, Wis. The property includes a 36,000-sq-ft building on about 5½ acres and was sold for $250,000. Milwaukee Faucets' present quarters at 301 W. Reservoir Ave. will be vacated except for the foundry operations, which will be continued temporarily.

Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago, has formed a new division, Griffin Pressure Pipe Div., to produce and sell centrifugally cast pressure pipe. Production is expected to start early in 1960 at the company's Council Bluffs, Iowa, plant. Initial annual capacity will be 40,000 tons.

Cast-Master Inc., Bedford, Ohio, maker of diecasting machines, has been purchased by Koehring Co., Milwaukee. Koehring plans to operate the Bedford plant as a division of its Hydraulic Press Mfg. Co. division, Mt. Gilead, Ohio.

Brown Thermal Products Corp. is the new name of the former Brown Thermal Developments Co., Elyria, O. Subsidiary of Brown Fintube Co., the firm develops and manufactures heat transfer products including hot-blast cupola equipment.

A. P. Green Fire Brick Co., Mexico, Mo., will construct a $2 million plant for the manufacture of basic refractories at Tarentum, Pa., about 20 miles northeast of Pittsburgh. The first unit of construction will consist of about 50,000 sq ft under roof on the 18-acre site.

Branford Co. has transferred its manufacturing facilities from New Haven to New Britain, Conn. The new address is 132 Glen St., New Britain.

Dace Industries Ltd., 504 Victoria Ave., Windsor, Ont., Canada, has been formed to manufacture and sell equipment in the air handling field in Canada. The firm has ex-

1 MILLION SAFE HOURS: J. D. Spalding, center, works manager, Torrance, Calif., plant, National Supply Co., accepts a National Safety Council Award of Merit for the plant's 1,113,570 manhours of operations with no lost-time injury. Left to right, Leonard McGhee, maintenance man; E. R. Treolar, maintenance foreman; Mr. Spalding; G. C. Merkley, plant manager; Joseph N. Kaplan, manager, Greater Los Angeles Chapter of NSC; and Sid Staxrud, plant safety supervisor. The plant also received the Steel Founders' Society Safety Award, which it had won five times before—in 1951, 1952, 1953, 1954, 1955

HERE'S WHY *you should try* "SEMI-STEEL" ABRASIVE

- First, it will cost you only $155 per ton, at least *$50 less* than steel abrasives.
- It will do just as good a job of cleaning as steel abrasives — and do it *faster!*
- It will come *mighty close* to lasting as long in service as steel abrasives.
- "SEMI-STEEL" is easier on equipment than steel abrasives — and *we'll guarantee it!*
- You'll get a *written guarantee,* too, that you cut cleaning costs with "SEMI-STEEL".

FREE ENGINEERING SERVICE....

METAL BLAST'S expert field engineer is ready to help solve your cleaning problems. Our testing lab is at your disposal, too. Write or phone for information on our Free Lab Test, engineering assistance and test samples.

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"SEMI-STEEL" IS MANUFACTURED AS SHOT AND GRIT TO S.A.E. SPECIFICATIONS. 50 OR 100 LB. BAGS, PALLETIZED IF DESIRED.

Circle 614 on Page 53

clusive Canadian licenses for dust and fume collectors made by Claude B. Schneible Co., Detroit, and for industrial cleaners made by Vibro-Pneumatic Cleaner Co., Bronson, Mich. R. Grant Whitehead, president and owner of Dace, was connected with Schneible for 18 years.

Truecast, division of Pointer Tool Co., Louisville, has been licensed by Ampco Metal Inc., Milwaukee, to produce Ampco metal as investment and permanent mold castings.

FEF Conference To Emphasize Importance of Casting Design

Technical aspects of the foundry industry, particularly as they relate to casting design, will receive the major share of attention at the 12th annual College-Industry Conference of the Foundry Educational Foundation.

The two-day meeting will be held at the Statler-Hilton, Cleveland, March 18-19.

Program subjects are aimed at the general theme of greater castings sales through design education in cast metals. Leading design educators, in addition to professors directly connected with the FEF program, are expected to attend.

Program details follow:

Wednesday, Mar. 18

8 a.m.—Registration—North entrance to Euclid Ball Room.

9 a.m.—Opening remarks—President F. X. Bujold, Ford Motor Co.

"An Introduction to Casting Processes and Casting Properties," Hans J. Heine, Malleable Founders' Society.

"Directional Solidification as Related to Design," W. P. Dudley, Ohio Steel Foundry Co.

"Use of Stress Analysis in Casting Design," R. J. Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

"Section Design for Cast Metals," John B. Caine, foundry consultant.

11:20 a.m—Discussion period—C. W. Briggs, Steel Founders' Society of America, leader.

12:15 p.m.—Luncheon: "Design and Use of Castings in the Aircraft Industry," L. H. McCreery, consultant.

2 p.m.—"Three-Dimensional Photoelasticity in Design," F. J. Bogardus, Purdue University.

"Case Histories of Government-Sponsored Castings Research," R. A. Flinn, University of Michigan.

"Examples of Effective Co-operation between Design Professors and the Foundry Industry," Dan Wright, Case Institute of Technology.

3:30 p.m.—Discussion period—G. K. Dreher, Steel Founders' Society of America, leader.

6:30 p.m.—Reception and banquet: "Russia Today," Irwin Such, *Steel.*

Thursday, Mar. 19

9 a.m.—Annual Meeting.

9:30 a.m.—Panel: "The Foundry Educational Foundation," R. B. Parker, American Brake Shoe Co., presiding.

"Engineering Education in Cast Metals," Merton C. Flemings Jr., Massachusetts Institute of Technology.

"Financial Assistance to Students," Warren Jeffrey, University of Alabama.

"Recruiting and Placement of Engineering Students and Graduates," R. W. Heine, University of Wisconsin.

"Foundry Industry Committee Activities," B. W. Niebel Pennsylvania State University.

12:15 p.m.—Luncheon: Presentation of new officers. "A Report on Foundry Education in Europe," J. L. Leach, University of Illinois.

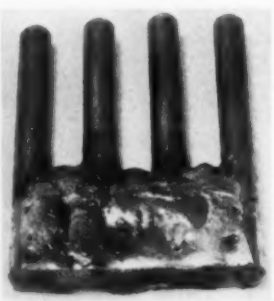
Canadian Firm Contracts with National Engineering Co.

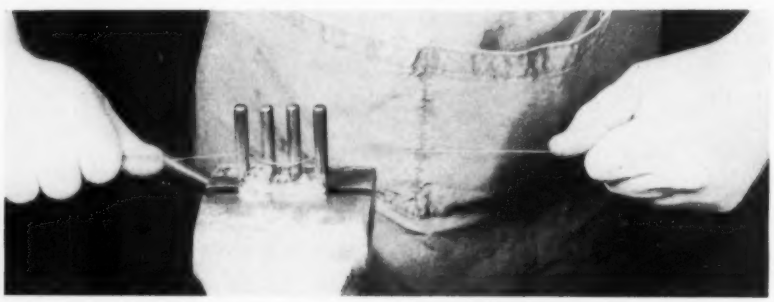
National Engineering Co. of Canada Ltd., subsidiary of National Engineering Co., Chicago, has acquired the business of the Maple Leaf mixer formerly manufactured by Cunningham Foundry & Machine Co., Ltd., St. Catherines, Ont. National will continue to supply this model machine to Canadian foundries and to service existing machines with parts made in Canada.

National Engineering Co. of Canada also has entered into a manufacturing contract with Cunningham for the latter to manufacture the Simpson mixer at St. Catherines for Canadian consumption. Agencies in Canada handling the two lines are Canadian Foundry Supplies & Equipment Ltd., Montreal 30; Edwin A. Swensson & Co., Willowdale, Ont., and Overseas Commodities Ltd., Vancouver 4, B. C.

HOW To Do It

FOUNDRY will pay a minimum of $15 for each "How To Do It" idea submitted and published

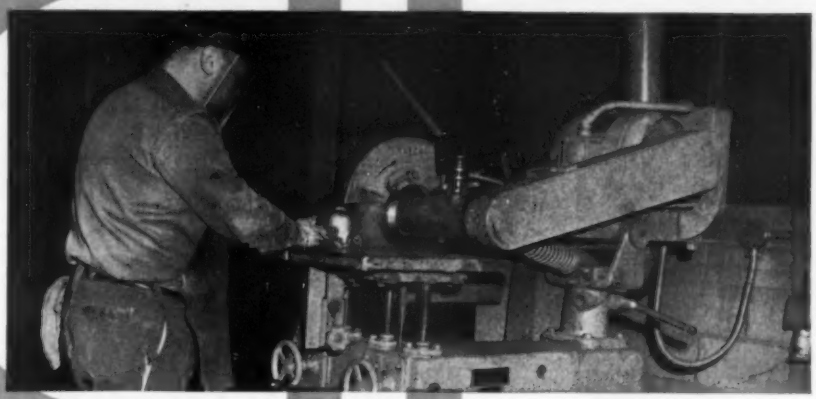




Core Rod Straightener Is Easy To Make

By H. J. GERBER
Assistant Professor
Oklahoma Agricultural & Mechanical College
Stillwater, Okla.

USED CORE WIRES can be salvaged for reuse with the straightening fork shown here. The device is made from cold finished round steel rod of about 5/16 in. diam. Four rods about 3 in. long with short spacers cut from the same rod stock are welded or brazed together. The tool is held in a vise, and the wires to be straightened are pulled between the rods. Even badly kinked and bent wires can be pulled straight with a small expenditure of time and effort.



Fall River Foundry, Fall River, Wisconsin, uses Tabor-Brasive Cut-Off, Model B-7½-AC, for clean, fast cuts on nickel, bronze, and brass gates.

Saves up to $400 per month with TABOR CUT-OFF

A new Tabor-Brasive Cut-Off Machine at Fall River Foundry, Fall River, Wis., paid for itself in five months, according to Harold E. Younger, Plant Manager. The Fall River Foundry, a subsidiary of Badger Meter Company, Milwaukee, cuts nickel, bronze, and 85-5-5-5 brass. The Tabor Cut-Off has saved up to $400 per month in band saw blades.

"In cutting 20% nickel gates, we formerly used $50-worth of saw blades per day," Mr. Younger says. "Now we are saving this cost and getting fast, clean cuts with the Tabor Cut-Off."

Tabor Brasive Cut-Offs are tough, precise, production machines. Reduce cutting time more than 50% when compared with sawing or chipping operations. Units range from 5 hp to 20 hp. Bulletin 575 gives full details — write for your copy today.

TABOR

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Co.
LANSDALE, PA. TELEPHONE: ULYSSES 5-5131

Circle 615 on Page 53

Audience at the recent meeting of the Malleable Founders' Society at which design of castings was the principal discussion topic

Lowell D. Ryan, MFS executive vice president, and Richard W. Crannell, society president

Malleable Founders Discuss

DESIGN OF CASTINGS

● SEMIANNUAL meeting of the Malleable Founders' Society, held at Cleveland, Jan. 15, featured a Casting Design Conference staged by personnel of Central Foundry Division, General Motors Corp. This conference was similar to the 14 held during the past year at the Saginaw plant for designers and users of castings (FOUNDRY, March 1958, p. 136).

In introducing the presentation on casting design, James H. Smith, general manager, Central Foundry Division, stated the conferences were developed because his organization had found an appalling lack of knowledge concerning the products, processes, and capabilities of that foundry's customers. In many cases castings buyers and users had never been in a foundry, had no idea how castings were made, and were not familar with the potential of castings.

The design conferences were organized to bring customers' engineers, designers, and buyers into the Saginaw plant. The program was arranged to show that today's modern foundry can provide castings of

Members of Central Foundry Div., General Motors, who participated in the program. Standing, left to right: Robert Hendricks, George A. Hach, Harold G. Sieggreen, C. Dale Evans, Louis H. Ravitch, John L. Flite, Donald R. Richter, and Fred Hammer. Seated: Lowell D. Ryan (Malleable Founders), Carl F. Joseph, James H. Smith, Richard W. Crannell (Lehigh Foundries Co.), Elmer E. Braun, L. L. Shafer

1 Whirl-Air-Flow system does 2 jobs!

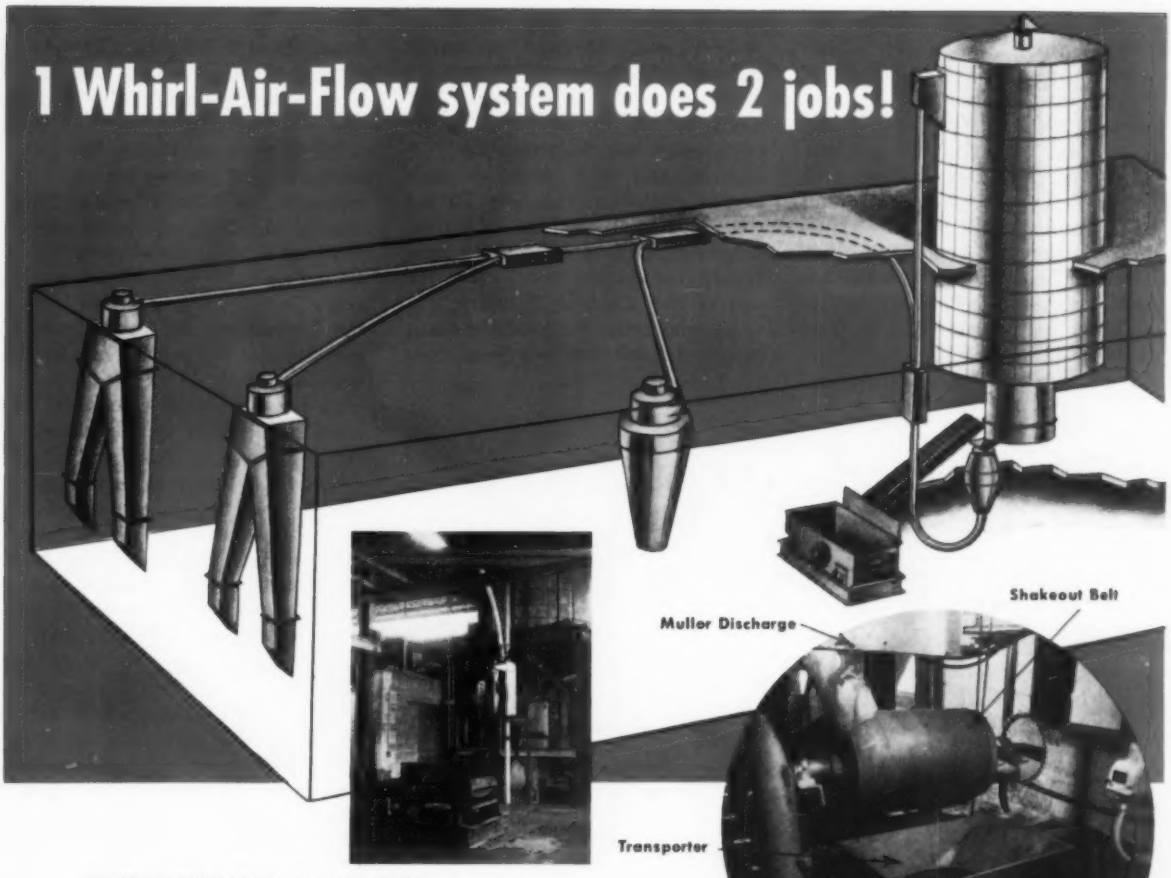


PHOTO SHOWS Shakeout in immediate foreground. Note Transfer Switch. Visible beneath 100-ton overhead storage Silo is Beardsley & Piper Speedmullor and System Control Panels.

PHOTO SHOWS Mullor Discharge and Feed Hopper of No. 150 Transporter. Note magnetic pulley to catch tramp iron and belt which automatically returns shakeout sand.

NEW SYSTEM AT CENTRAL MACHINE WORKS SPEEDS PREPARED SAND TO MOLDING STATIONS AND SHAKEOUT RETURN TO OVERHEAD STORAGE

For years the Central Machine Works, Minneapolis, struggled with their old method of handling sand. They needed three men to prepare sand on the floor, mull the facing sand in a small mullor and deliver needed quantities to each station by wheelbarrow.

Now, with their Whirl-Air-Flow system, sand preparation, delivery and shakeout return are handled automatically under the control of one man. The system repeatedly wins enthusiastic praise for its clean, efficient, inexpensive performance.

Whirl-Air-Flow transfer switches strategically located permit delivery of sand to the various stations or to the overhead silo . . . at the touch of a button! Maximum free floor space is achieved with unique overhead storage.

Tell us your sand handling problem! Let us show you how Whirl-Air-Flow pneumatic conveyor systems, engineered to your individual requirements, can boost your production while giving you appreciable cost savings.

WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

630 25th Avenue S.E., Minneapolis 14, Minnesota — FEderal 9-0221

Circle 616 on Page 53

a uniformly high quality; that the castings process has inherent advantages over other methods of shaping metals; that the cost of castings can be reduced by proper design and allowance of practical tolerances; that malleable and pearlitic malleable irons can be used advantageously in many applications frequently overlooked; that substantial reductions in weight are possible through the use of pearlitic malleable iron, stress analysis, and shell molding; and that it is possible to perform many operations on pearlitic malleable iron previously believed impossible.

Following the presentation, Mr. Smith stated the reception to the conferences has been excellent. A questionnaire was given to each person attending, and over 70 per cent have returned them with their comments, most of which have been highly complimentary. In the opinion of Central Foundry Division management, these comments clearly demonstrate that people are hungry for information about foundries and castings. Therefore, everyone in the industry should do all possible to supply such information.

While the organization has given customers and leading educators information on today's foundry techniques, Mr. Smith believes today's techniques will be obsolete in a short time. He pointed out we already are finding ways to utilize the byproducts of atomic energy, but thus far the surface has barely been scratched. One of these applications is use of Cobalt 60 radiography, which was discussed in the presentation. Another is a development of the company's experimental engineers in the use of radioactive isotopes to control moisture content of sand automatically. Possibilities of using isotopes to improve melting procedures, to improve dimensional control, and to detect cracks also are being explored.

Mr. Smith stated there is every indication that the physical properties of metals can be increased many-fold through the use of nuclear energy, thus leading to stronger, lighter ferrous castings.

In tough grinding nothing beats a FOX

- Constant Peripheral Speed
- Maximum Clearance
- Vibration Free Spindle
- High Production • Low Maintenance
- Operator Safety

FOX #1-24
10-15-20 horsepower: Grinding wheel 24 x 3 x 12".

FOX #1-30
15-20-25 horsepower: Grinding wheel 30 x 3 x 12".

FOX GRINDERS, Inc.
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Book Review

Stahleisen-Woerterbuch **(Steel and Iron Dictionary), imitation leather, 264 pages, 3⅞ x 5⅝ in., published by Verlag Stahleisen m.b.H, Breite Str. 27, Duesseldorf, Germany. Price 12.50 D.M.**

This third edition of a technical dictionary conceived at the joint meeting of the British Iron and Steel Institute and the Verein Deutscher Eisenhuettenleute in Duesseldorf in 1936 has been expanded and improved considerably over the earlier editions published under the title Aus der Fachsprache des Eisenhuettenmannes through the co-operation of both organizations.

It contains over 7000 technical terms employed in the iron and steel industry. First section of the book constitutes the German-English portion, which is followed by the English-German counterpart. Back of the book contains many tables to facilitate conversion of units of weight, measure, etc., from metric to English system and vice versa.

Coming in April...

OPERATION MARKETING

A SPECIAL EDITORIAL REPORT

Featuring 5 timely articles on:

EXPANDING THE MARKETS FOR CAST METALS

FOUNDRY's APRIL Pre-Convention issue will feature five "IDEA" articles . . . offering you:

. . . constructive marketing approaches to better business for foundries

. . . a review of business-building ideas which have been tried and found successful by casting producers

. . . a practical approach to the timely problem of how foundrymen can broaden their markets

Watch for this special editorial report in the . . .

FOUNDRY

APRIL 1959 PRE-CONVENTION ISSUE

AFS CASTINGS CONGRESS
and 2nd Engineered Castings Show
Chicago—April 13-17, 1959

1 SETTING UP A MARKET DEVELOPMENT PROGRAM

Planning is the key to broader markets for castings. This report will present a step-by-step approach to the organization of a marketing program for foundries. By George K. Dreher, market development manager, Steel Founders' Society of America, Cleveland.

2 EXPANDING MARKETS WITH CUSTOMER CLINICS

Many foundries have found that customer clinics are effective sales tools. This report by the editors of FOUNDRY is based on a study of seminars and conferences which have been sponsored by various foundry groups for their customers and prospects.

3 IMPROVED DESIGN STIMULATES BUSINESS

There are numerous ways in which redesign of a casting can result in a better and more economical product. Examples of how various parts have been redesigned, and the use of radiography in such development work, are described by Donald F. Richter and John L. Flitz, Central Foundry Division, General Motors Corp., Saginaw, Mich.

4 HOW TO MANAGE FOR PROFITABLE GROWTH

Management must establish realistic objectives based on knowledge of its company's markets and costs. Plans and controls must be formulated to attain those objectives. By Gregory M. Boni, senior partner, Touche, Niven, Bailey & Smart, New York.

5 MANAGING A FOUNDRY PROFESSIONALLY

This presentation will provide a detailed analysis of professional management policies for foundries, with a special look at the importance of new equipment purchases. By Glenn Cook, manager of marketing, Foundry Dept., General Electric Co., Schenectady, N. Y.

63rd CASTINGS CONGRESS and 2nd Engineered Castings Show

AMERICAN FOUNDRYMEN'S SOCIETY

CHICAGO
April 13-17, 1959

FOUNDRY

APRIL 1959 PRE-CONVENTION ISSUE

The APRIL Pre-Convention issue of FOUNDRY will be mailed to reach foundrymen well in advance of the convention.

OPERATION MARKETING

A timely five-part editorial report with lots of "idea" content.

AFS CASTINGS CONGRESS AND SHOW

Complete details on the technical program and convention activities related to the meetings and Show.

FEATURE STORIES AND REGULAR DEPARTMENTS

Regularly scheduled features, Late News, Questions and Answers, and other departments will appear in the APRIL issue as usual.

And in May...

POST CONVENTION ISSUE....

Our editorial staff will record and report the complete story of this year's convention. You'll get the full story in words and pictures in the MAY Post-Convention issue of FOUNDRY.

FOUNDRY

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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

Gives Creep Data

INVESTIGATION of creep of cast specimens of 80-10-10, 85-5-5-5, and Navy M (88-6½-1½-4) copper-base alloys was conducted by J. G. Kura and R. M. Lang and reported in a paper, "Creep Properties of Three Low-shrinkage, Copper-base Casting Alloys," at the annual meeting of the American Society for Testing Materials. At 350° F the highest creep resistance was exhibited by Navy M. At 450° F Navy M and 85-5-5-5 alloys were about equal. Both alloys also were about equal in creep resistance at 550° F, but Navy M appeared more stable at that temperature.

Resists High Temperature

DEVELOPMENT of a new family of iron-aluminum-manganese alloys which combines light weight, excellent cold workability, high temperature strength, and oxidation resistance may result in a low-cost high-temperature alloy without use of chromium and nickel.

Investigation sponsored by the Navy's Bureau of Aeronautics was carried out by National Research Corp., Cambridge, Mass. The new steels are austenitic in structure and lighter than carbon and stainless steels, and cobalt and nickel-base superalloys. Indications are that tensile strength approaching 250,000 psi may be reached.

Composition of the most promising alloy is 10 per cent aluminum, 34.4 per cent manganese, 0.76 per cent carbon and remainder iron.

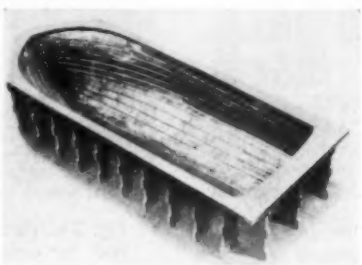
Shivers and Shakes

ACCORDING to a Czech source, highly stressed parts of Soviet rockets are produced from materials which have been subjected to ultrasonic vibration during the solidification process. It is indicated that the vertical vibrations are in the order of 20,000 cycles per second with horizontal vibrations about ten times higher. This treatment results in a superfine grain structure material possessing supposedly remarkable properties.

It is suspected that the mentioned remarkable properties are due not alone to ultrasonic vibration but to incorporation of refractory metals or materials in powdered form which are held in suspension ultrasonically for uniform distribution during the solidification process.

Precision Casting

LARGEST fiber glass reinforced plastic part made by the matched metal die molding process is claimed by Molded Fiber Glass Boat Co., Union City, Pa. It is a lapstrake boat hull nearly 17 ft long, slightly over 6 ft wide, and weighs over 200 lb. Mold or die cavity shown in the accompanying illustration,



used for producing the hull, is said to be the largest precision casting ever made of Meehanite, and was poured by Johnstone Foundry Co., Grove City, Pa. Preparing the hull mold for use required only hand grinding and polishing. The mold weighs 41,000 lb, is 18 ft long and 7 ft wide. Metal core for the mold, also made by Johnstone, will be machined to match the mold cavity.

Reduces Deformation

ZIRCON sand additions to silica sand materially reduce mold deformation in a nearly linear relationship, according to one steel foundryman. Hence, for critical castings a facing composed of all zircon sand, 1½ per cent fireclay, 1 per cent graphite, and sodium silicate binder as required is recommended. A parting composed of 1 part lard oil with 6 parts kerosine is said to function satisfactorily.

Epoxy Resin Seals

ONE type of epoxy resin has been used successfully on the head of a coreblower, and the rubber gasket on the periphery of the corebox has been replaced by the same material, according to Furane Plastics Inc., Los Angeles. When the head of the machine comes down against the box, the pressure forms a tight seal on the epoxy resin between the two faces and prevents sand blowing out. Material is called Epocast 11B.

Better Coke

PREHEATING of certain weak coking coals before carbonization improves the resulting coke, according to a report of the Bureau of Mines, Department of the Interior. Improvement was greatest when the heated coal was coked without cooling. Tests were conducted at the bureau's Pittsburgh station by F. W. Smith, G. W. Birge, D. E. Wolfson, and D. A. Reynolds. Copy of Report of Investigations 5418, "Better Coke by Thermal Pretreatment of Coal; Results for Illinois No. 6-, Pittsburgh-, and Mason-bed Coals" may be obtained from Publications-Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13.

Shows Muscle

REPORTS indicate that a new titanium alloy exhibits strength properties exceeding most steels for long periods at temperatures of 1100° F and for short periods to 1500° F. Developed by Mallory-Sharon Metals Corp., the alloy contains 8 per cent each of aluminum and zirconium and 1 per cent tantalum and columbium combined. At present the material is available only as forging stock.

Foundry Employs New

HANDLING and

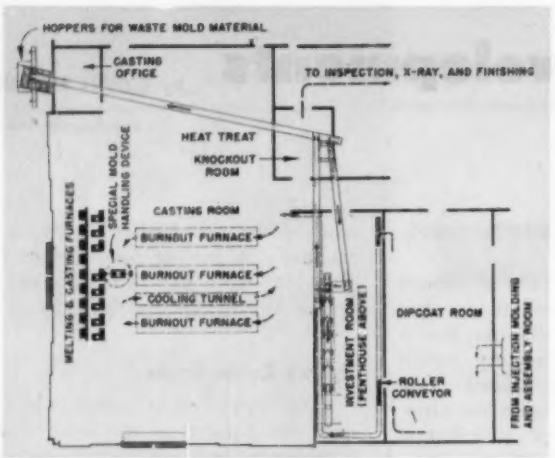


Fig. 1—Flow diagram of casting and mold material salvage operations. Broken lines show equipment in the plant; solid lines show roof units

Fig. 2—Pattern storage conveyor in the injection room. The loading leg is at right foreground

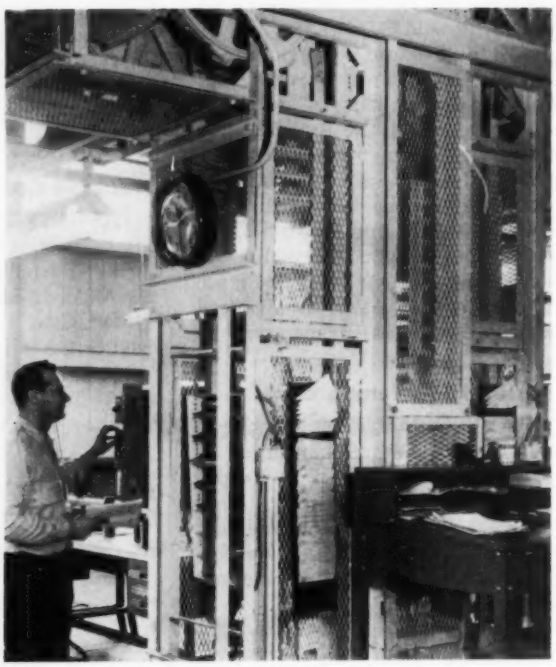


Fig. 3—Operator pushes button to bring a numbered rack for unloading. Record cards are shown in rack

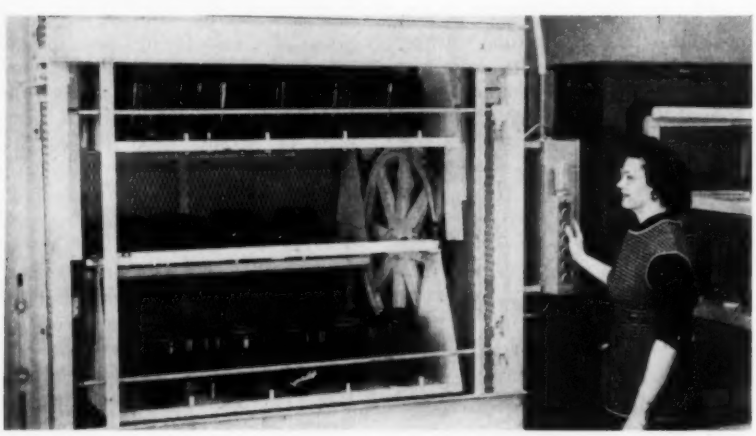


Fig. 4—Assembled pattern clusters are set on storage conveyor racks

Fig. 5—Worker dips pattern cluster in fine refractory slurry. Coarse silica sand is sprinkled on to provide a tooth for backing material

STORAGE TECHNIQUES

A system of overhead double-chain tray conveyors provides for the indexing, storage, circulation, and delivery, on demand, of investment casting process patterns and castings

● MASS PRODUCTION techniques for investment-cast vanes and blades used in turboprop and turbojet engines are constantly under study by Austenal Inc.

Continuing growth of this firm, with facilities in Chicago, New York, and Dover, N. J., led to the recent design and construction of a multimillion dollar plant at La Porte, Ind. It incorporates the latest equipment for producing and setting up patterns, investing molds, material handling, and process control.

In planning the 85,000-square-foot building, the engineering construction firm made use of Austenal's 30 years of experience and research in the investment casting field. The operation at the La Porte plant was engineered to give fast and accurate control over storage and process flow and to facilitate later expansion.

A major requirement was to provide for both the easy storage and ready availability of a large number of components in process, any one of which might be in a different processing stage. An arrangement was needed which could index, store, circulate, and deliver on demand without interrupting the continuous process system important to plant operation.

The result is a unique combination of overhead storage facilities with double-chain tray conveyors indexed for the immediate location

Fig. 6—Completed molds travel to the burnout furnaces on this gravity roller conveyor

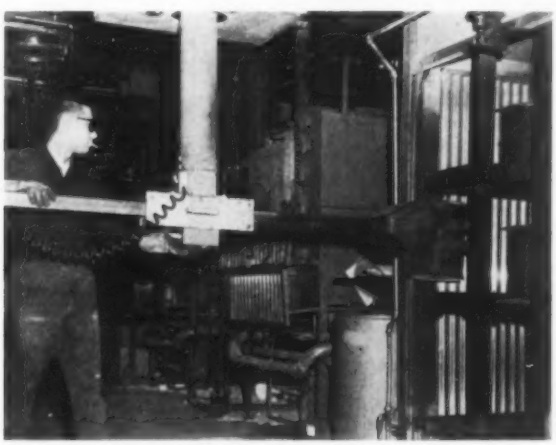


Fig. 7—Special handling device moves molds from burnout furnaces to melting-pouring furnaces, and, as shown here, to conveyors in the cooling tunnel

Fig. 8—Flasks, which contain pattern clusters, are placed under hoppers to receive backing investment

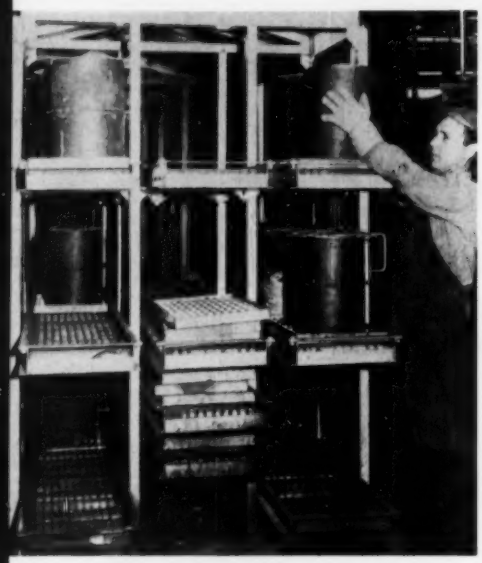


Fig. 9—A mold is removed from cooling tunnel. Pallet return conveyor is at bottom center

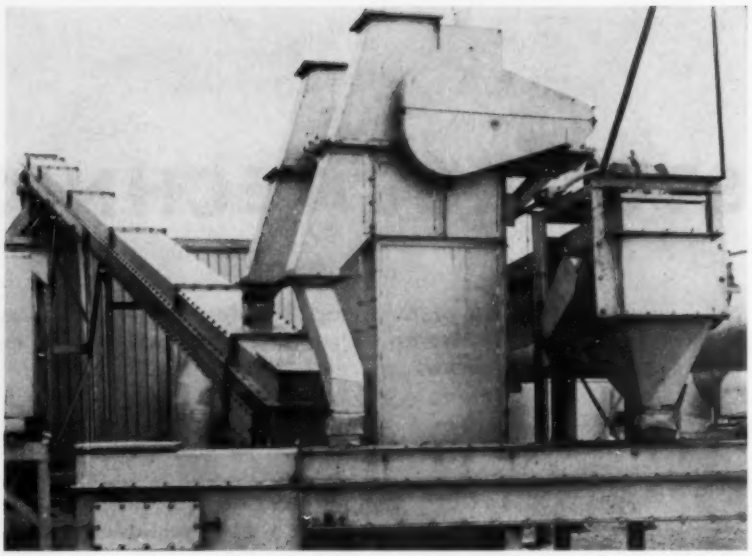


Fig. 10—Bucket elevators bring used mold material to the roof from the knockout room. Enclosed conveyor in foreground delivers waste to disposal. Inclined conveyor delivers to recovery equipment in penthouse

and use of any specific component. Three of these dual-purpose conveyors are in the injection room and three in the inspection and finishing room. In designing these conveyors the engineers had to consider such factors as hourly rate of production, space per tray, and the time between operations.

Continuous Operation—In the injection room, plastic or wax patterns are made and assembled into clusters. These operations are subjected to process inspection. The storage conveyor, Fig. 2, for single wax patterns is shaped like a T with the 64-ft-long horizontal section hung from the ceiling to save floor space. It consists of 29 storage racks, each of which can accommodate various sizes of trays or pans of patterns. The conveyor is designed to keep the racks in vertical position at all times.

One side of the vertical section is for loading, the other for unloading. When the operator stores a tray of patterns on a rack, he indexes it to correspond with the rack number. When a particular pattern is needed, he checks the index number and presses a button to start the conveyor, Fig. 3. The button is released as the correctly-numbered rack, traveling at 45 fpm, reaches the unloading side of the conveyor. The pattern is removed and can be put into production immediately.

When loading patterns into storage, however, the operator presses a button and releases it immediately. This causes the conveyor to move, at the rate of 15 fpm, the distance between one tray and the next. In other words, patterns are made available quickly for unloading yet may be loaded into the system at a more leisurely pace.

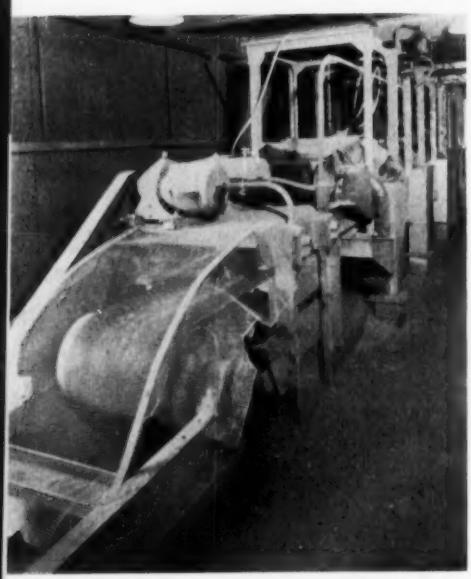


Fig. 11—Used mold material is segregated for reuse in penthouse above investment room

The advantage of this system is that it is possible, simultaneously, to build up a backlog and still allow for immediate withdrawal of a part to handle rush orders.

Thus, in combining indexing with circulating, surge storage capacities can be built up without sacrificing the benefits of continuous processing. And a new concept of batch co-ordination has been made possible wherein an accelerated part of the process can be retarded to the pace of other processes, and vice versa.

Two similar storage conveyors, L-shaped, are on either side of the one described above. They consist of 42 racks each (Fig. 4) and are used for storing a variety of assembled pattern clusters. Each rack holds an average of 12 clusters, although this varies with the size of the clusters.

Processing Steps — After careful inspection for detail and surface smoothness, patterns are assembled into clusters and are ready for the dipcoat process in the adjoining room. Each cluster is dipped into a thin slurry of controlled grain size refractory (Fig. 5). Then coarse silica sand is sifted over the cluster to provide a tooth for good adhesion of the backing. This process may be repeated to build up the thickness and strength of the primary coating. Dipcoated clusters

Announcement

Taccone Pneumatic Foundry Equipment Corp.

Acquires

WM. H. NICHOLLS CO., INC.

We are pleased to announce the purchase of the Wm. H. Nicholls Co., Inc. of Richmond Hill, Long Island, N.Y.

The Nicholls firm, which for more than half a century has manufactured and serviced its line of molding machines, will continue operations at its Long Island location.

Mr. William Nicholls remains active in the business and also serves as a member of the board of directors of the new Wm. H. Nicholls Co., Inc.

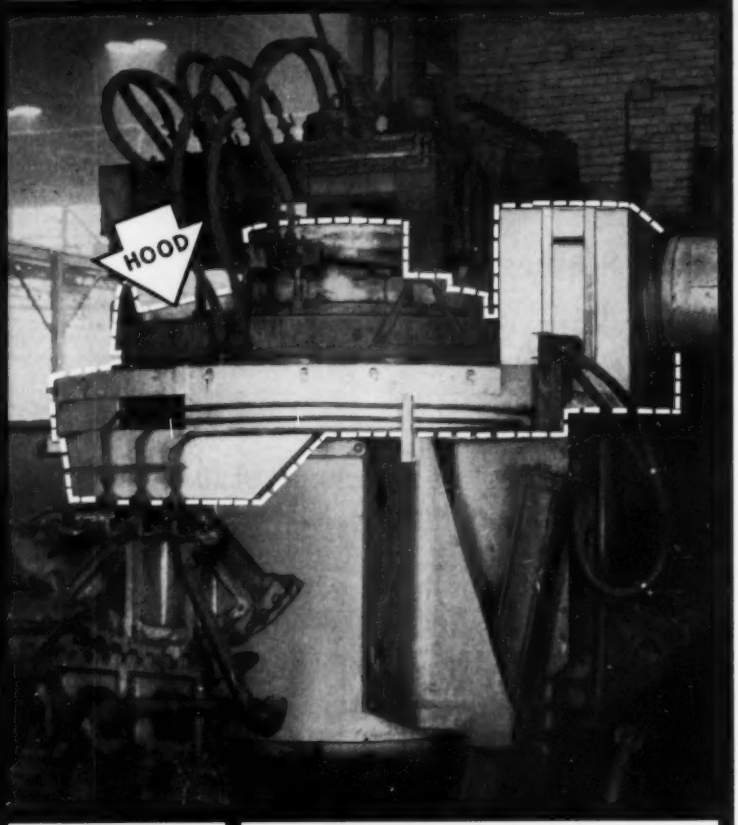
We assure foundry equipment buyers and, in particular, users of Nicholls equipment, that we will continue to provide new equipment, parts and service, in the manner which has made Nicholls a byword in the foundry for the past fifty years.

Russell W. Taccone, President

TACCONE PNEUMATIC FOUNDRY EQUIPMENT CORP.
and WM. H. NICHOLLS CO., INC.

Circle 618 on Page 53

CONTROL ELECTRIC FURNACE FUMES



Pangborn offers a new concept in electric furnace exhaust hoods!

After years of development, Pangborn now offers effective control of smoke, fumes and dust from electric melting furnaces with minimum interference to furnace operations and maintenance. The hood design is based on the fundamental dust control principle of confining and capturing fumes and dust immediately adjacent the source. Effective control is secured with substantially reduced exhaust air volumes.

The Pangborn Exhaust Hood reduces the weight carried by the furnace roof; reduces hood areas subject to high temperatures; reduces electrode travel limitations and is applicable to top and side charge furnaces of all types and sizes.

With the exhaust hood connected to an efficient Pangborn Cloth Bag Collector, compliance with the most rigid air pollution control regulations is assured. For information call the Pangborn man in your area or write: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn CONTROLS DUST

are placed on racks and allowed to dry from 8 to 24 hr.

Investment—Tubular metal flasks are placed on greased steel plates and about 1 in. of investment material, similar to plaster of paris, poured in to seal the bottom. Dip-coated clusters are placed, sprue end down, in the center of the flask and the assemblies set on a roller conveyor, extending 150 ft around three sides of the investment room.

The conveyor is divided into two decks on the third side for the investing operation. The top conveyor is for invested flasks, the bottom one for unfilled flasks. Operators at the investing station place unfilled flasks under either of two hoppers for filling with the backing investment material (Fig. 8). A vibrator packs the investment tightly around the pattern cluster. An 8-ft roller conveyor, Fig. 6, delivers the invested flasks to racks at the entrance of one of three burnout furnaces.

Burnout—The furnace performing the double function of dewaxing and mold preheating is a gas-fired pusher type unit 40 ft long. It is divided into five zones where the temperature ranges from 375° F at the entrance to between 1600° and 1900° F at the exit. The molds weigh 50 to 60 lb. They are removed from the greased steel plates and placed upside down in the furnace so the pattern material will run out as it melts.

A way had to be found to remove each of the molds from the furnace, transfer it to the melting-casting furnaces, position the sprue over one of the furnaces, invert both units to allow molten alloy to run into the mold, and then to transfer the mold to a cooling tunnel.

A special piece of equipment shown in Fig. 7 was designed to perform these jobs. It has powered vertical movement, a clamping device at one end, and is suspended from overhead rails allowing a horizontal run of 90 ft. With it the operator can grasp a hot mold in the preheat furnace, remove it, and swing 180 degrees to the electric arc alloy melting-casting furnaces.

Pouring — A pneumatically-operated clamping bar actuated by a foot pedal holds the mold in place. Then the mold and the furnace, which is mounted on a trunnion, are inverted, transferring a pre-

weighed amount of molten metal from the furnace into the mold. Proper temperature of the metal for pouring is determined through radiation pyrometers connected to recording and indicating instruments mounted on a panel adjacent to the furnace. If the metal is too hot, a red light flashes; if too cold, a green light flashes.

The sprue is covered with insulating powder immediately after pouring to slow the cooling rate. An operator, using the special handling device, transfers the poured mold to the cooling tunnel shown in Fig. 7.

This tunnel consists of eight, 40-ft-long roller conveyors in a tunnel where molds cool for about 8 hr. Poured molds are set on steel skids, which ride on the conveyor rolls. Skids return to the tunnel entrance on gravity roller conveyors in the middle of the tunnel as shown in Fig. 9. Cooled molds are placed on carts and rolled to the knockout room.

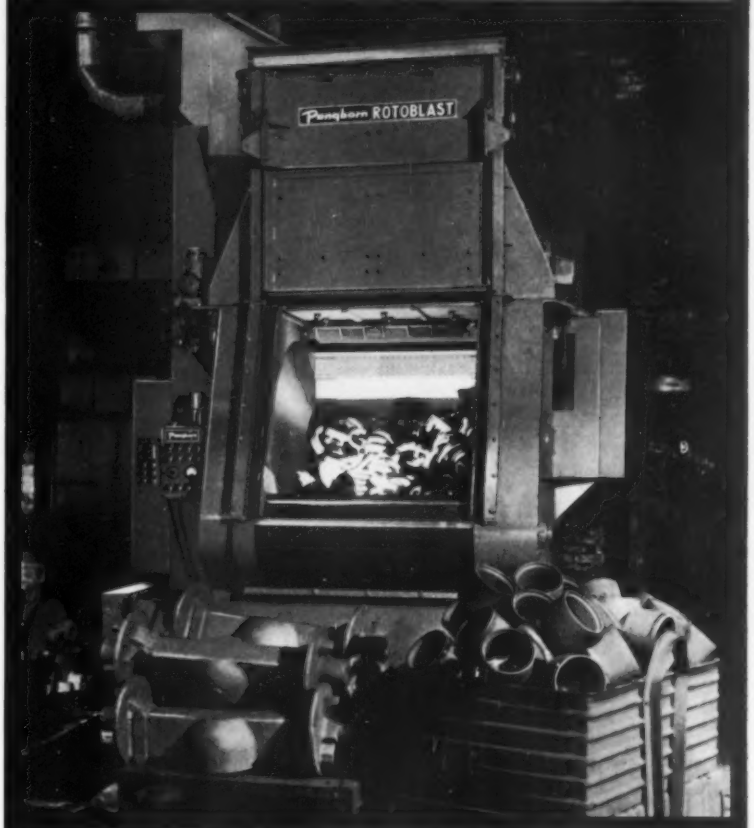
Re-use Mold Material—Operators in the knockout room use vibrating air hammers to free the casting from the investment material and the flask. Large pieces of mold material are directed into one of three hoppers. A bucket elevator carries this waste material to an enclosed belt conveyor on the roof (Fig. 10). This conveyor carries the waste to two hoppers for ultimate disposal.

Small-sized material from the molds is directed into two additional hoppers in the knockout room. Short oscillating conveyors under these hoppers carry the material to a second bucket elevator which empties onto an enclosed belt conveyor on the roof for transporting the material to a four-deck vibrating screen enclosed in a penthouse over the investment room as shown in Fig. 11.

Large material vibrated off the first screen falls to a belt conveyor which dumps onto the waste conveyor, feeding the waste hoppers. Material coming off the second screen slides down a chute to a belt conveyor and is deposited by a bifurcated feeder into two storage hoppers in the investment room. The third screen vibrates intermediate material off to a chute leading to a belt conveyor which empties to the waste conveyor.

The fourth screen retains the fine material, which is gravity fed to a

CUTS MAN-HOURS 38%



Pangborn Rotoblast cuts man-hours per day from 24 to 15 at Meadville Malleable Iron

The investment in a new 20 cu. ft. Pangborn Rotoblast Barrel has really paid off for Meadville Malleable Iron Co., Meadville, Pa.! By switching from a competitive barrel of about 12 cu. ft. capacity, the firm now cleans loads three times as large in half the time. Today tote box loads averaging 1900 lbs. each are cleaned in 4—5 minute cleaning cycles. As a result, the Rotoblast Barrel has cut 24 man-hours per day to 15 man-hours in the cleaning department and greatly improved the quality of the work.

How much time and money can Pangborn Rotoblast save you? It would pay you to talk to the Pangborn man in your area. Or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn

CLEANS IT FAST WITH ROTOBLAST®

Circle 620 on Page 53

CONVENIENT, QUIET, SAFE

The New Hevi-Duty Electric Resistance Holding Furnace

The holding furnace brings a new degree of speed, convenience and safety in the production of aluminum castings . . . and a new high in metal quality, too. There is no turbulence, no noise and a minimum of dross formation. It holds metal overnight, or over a weekend if necessary. The unit is extremely compact and unusually cool to work with.

Further, it is simple to service. Resistance elements can be replaced while furnace is in operation. If charge freezes due to power failure, it can be reheated without damage to furnace. There are no pots to break or replace. Linings last for years under normal conditions and are standard brick shapes — available locally.

Find out how its quiet efficiency can aid your operation. Call your Hevi-Duty representative or write for Bulletin 150.

- Industrial Furnaces electric and fuel
- Laboratory Furnaces
- Dry Type Transformers
- Constant Current Regulators

HEVI-DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

belt conveyor mounted above the conveyor handling salvaged material from the second screen. Five air-cylinder-operated plows controlled by switches in the investment room and a sixth, fixed plow at the end of the conveyor remove the fine material to three hoppers. The plows are operated in pairs, each pair serving one hopper.

Switches controlling the entire salvage conveyor system are arranged in a sequential pushbutton system for safety reasons. The entire conveyor system must be operated beginning with the final unit. In this way, no intermediate part of the system can be operated separately. Therefore, pile-up of material at transfer points is averted.

Castings Inspection — Casting clusters are transported from the knockout room to the cutoff area where castings are removed from the gating system and visually inspected. Satisfactory castings go directly into the x-ray room. Here, within a cubicle with walls of 18 in. concrete and 5-in. lead doors, castings are photographed by a 1-million volt machine. An elaborate system of precautions keeps the operator of this machine from exposure to the x-rays.

The operator puts groups of castings on a pallet with the film located in a lead cassette. A door of the cubicle moves down to open, and a small, hinged roller conveyor bridges the gap to the interior of the cubicle. The pallet is pushed to a belt conveyor in the cubicle. Operators outside the cubicle control movement of the belt conveyor to position pallets of castings under the x-ray machine. The door is closed by the operator and the x-ray made. A door on the opposite side of the cubicle opens and pallets of castings roll out of the cubicle on a second roller conveyor similar to the one mentioned above.

After the x-ray inspection, pallet loads of castings ride on a double-deck gravity roller conveyor to the finishing room. Here they are distributed to operators for various finishing operations or to storage on one of three storage-conveyors similar to those in the injection room. Finishing operations are performed with abrasive belts and points, or by tumbling with stones.

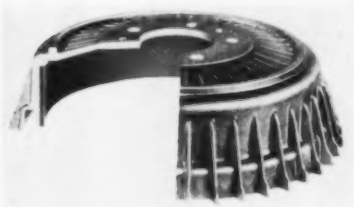
Following gaging to check for re-

quired tolerances, the castings are subjected to Zyglo inspection for any microscopic defects in the castings. Finally, code numbers indicating full processing details are etched electrolytically on a noncritical area of the casting. Castings are transported to the shipping department where they are packed in boxes for shipment. On occasion, finished parts are re-x-rayed, and the negative enclosed in the box for the customer's use.

The new plant was designed and constructed by Wigton-Abbot Corp., Plainfield, N. J. Gifford-Wood Co., Hudson, N. Y., designed, engineered, and constructed the material handling and storage systems.

Kelsey-Hayes To Manufacture New Integral Wheel Drums

Kelsey-Hayes Co., Detroit, has been licensed by the Fairchild Engine & Airplane Corp., Deer Park, L. I., N. Y., to use its Al-Fin molecular bonding process in production

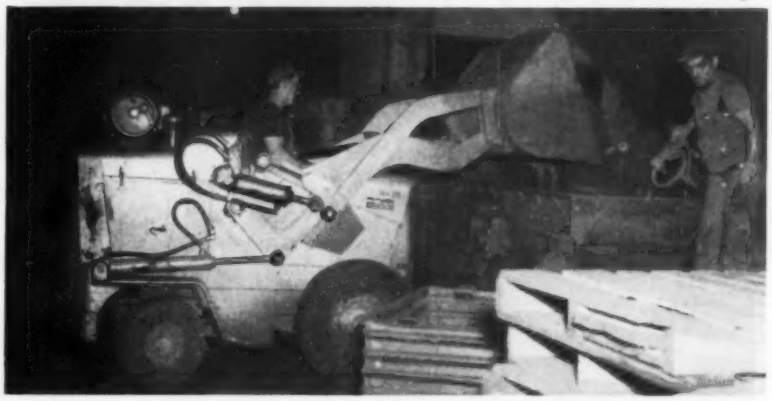


of bimetallic, integral wheel drums. Kelsey-Hayes is the nation's largest producer of automobile wheel and braking equipment and will make the new drums for original equipment use on Big Three passenger cars.

The drum consists of an integrally cast aluminum wheel, hub, and drum which is bonded to a cast iron friction liner. It results in a lightweight, faster cooling, and a longer lasting braking system, it is claimed. Buick adopted this type of drum as standard equipment on its 1959 models.

The Al-Fin process of molecularly bonding dissimilar metals led to the development of the bimetallic drum. The Al-Fin drum serves as a heat exchanger which rapidly conducts braking heat, without temperature drop at the interface, from the cast iron liner into the aluminum drum, from which it is dissipated into the air by 45 exterior fins.

PAYLOADER® maneuverability



"Power-steering makes a big difference

. . . works faster in close quarters"

That's one of the significant comments of J. T. Williams, plant manager and Edwin Daugs, "PAYLOADER" operator, of Grede Foundries Inc. at Reedsburg, Wis., concerning their model H-25. This Milwaukee company, with seven plants in the Midwest, has enjoyed many years of profitable experience with "PAYLOADER" tractor-shovel use in their steel, gray iron, ductile iron and alloy iron casting operations.

The Reedsburg product is ductile iron and its Model H-25 has important duties there day and night. It breaks the molds on the floor, then picks up sand and castings and delivers them to the shakeout. It takes used sand to the muller and delivers 30-35 loads of reconditioned sand per hour to the molding stations . . . also hauls limestone and coke.

Power-steering is one of the many features of the new H-25 "PAYLOADER" that makes it more productive. Its 2,500 lbs. carry capacity is 25 to 50% more than has heretofore been available in a 6-ft.-turning-radius tractor-shovel. It has power-shift transmission for fast, easy shuttling and maneuvering and including exclusive two-speed ranges in reverse. Power-transfer differential is another exclusive in its size class — a feature that transfers more power to the other drive wheel when one of them gets on slippery or loose footing. It reduces wheel-spinning, time-wasting inaction.

Your Hough Distributor is ready to show you all the other superior advantages of the new Model H-25 — why it is the most productive and most durable tractor-shovel anywhere near its size.

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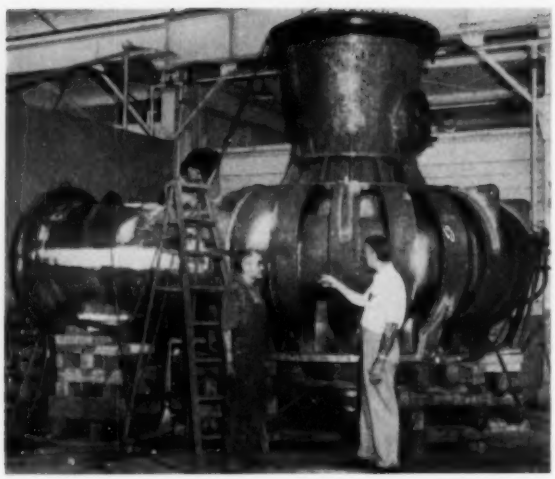
News Views

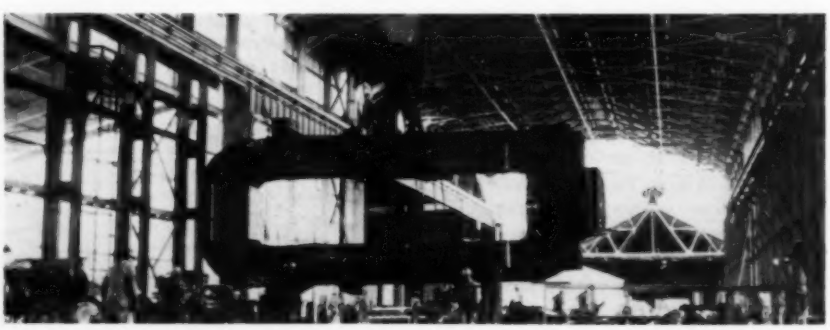
CRANE OFFICERS: Newly elected officers of the Electric Overhead Crane Institute are, left to right, Armand R. Walkley, president; William H. Morgan, vice president; Joe H. Peritz, executive secretary and treasurer; and Robert F. Rice, John S. Jackson, and William W. Peattie, directors



19-TON PUMP CASES: The centrifugal pump shown here is one of a number installed in pumping stations of the Colorado River Aqueduct System. The case is a 19-ton steel casting with 10-ft OD and a diameter of more than 14 ft over the discharge section. All of the cases for pumps now in operation were cast at the Torrance, Calif., plant of National Supply Co. Each was cast in a molding pit and required 89 separate cores. National Supply also made the stainless steel impellers for the pumps. They are 78 in. in diam, weigh 9250 lb

NEW LIGHT SOURCE: A future new source of light production, these cells of electroluminescent plastic are undergoing life testing in a dry box. Essentially, such a cell is a layer of phosphor between two electricity-conducting surfaces, one of them transparent. Voltage applied across the cell charges it and makes the phosphor emit light. The young lady is Miss Helen Mikulski, measurement engineer in the new General Electric Lamp Research Center, Nela Park, Cleveland

ALUMINUM CRANE: According to Reynolds Metals Co., Richmond, Va., this view shows the largest overhead aluminum crane in the world moving a 200-ton housing for the world's largest aluminum hot rolling mill, at Reynolds' plant in Sheffield, Ala. The crane's rated capacity is 150 tons. It had only a fraction of an inch momentary deflection as it lifted the housing, engineers said

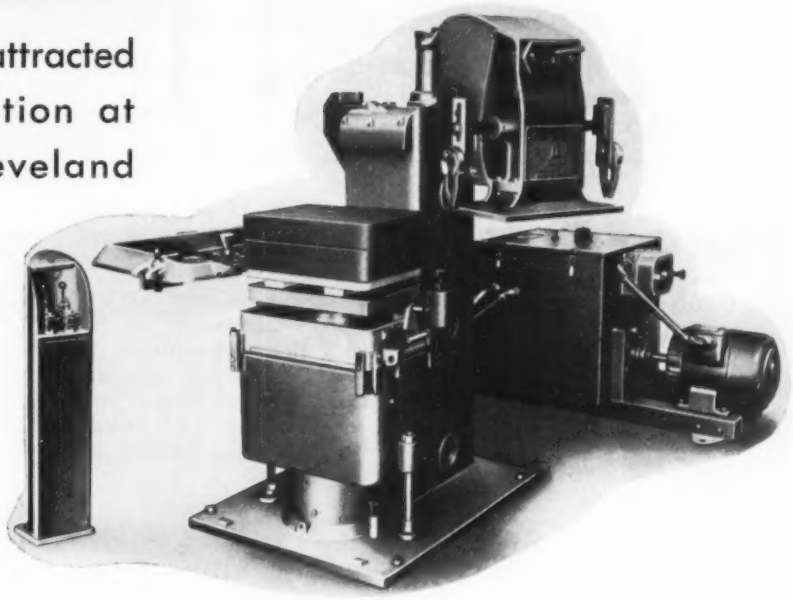


H.E.B.

HYDROIL-ELECTRIC FLASKLESS MOLDING MACHINE

The Machine which attracted your special attention at Foundry Show, Cleveland May 1958.

H.E.B. IS THE ONLY MACHINE OF ITS TYPE IN THE WORLD—



IT FEATURES:—

✱ **One man operation** . . . . .
produces complete flaskless mold (cope and drag made simultaneously) in 35/40 seconds—up to 100 molds per hour.

✱ **Two standard mold sizes** . . .
17″ x 12″ on H.E.B.1 and 18″ x 14″ on H.E.B.2 for high speed production of light castings using double face pattern plates.

✱ **3 Second pattern change** . . .
lift out and drop in new plate!

✱ **Core setting** . . . . . .
one easy movement.

✱ **Independently powered** . . . .
high pressure vane type oil pump unit with remote control.

✱ **Minimum maintenance** . . . .
oil operation in closed circuit; non-rusting, non-freezing; no long pipe lines; no pressure loss.

Send for Bulletin 151/NA for full description and diagrams showing unique operating principles.

U.S. Pat. Pending; Canadian Pat. No. 531479; British Pat. No. 748551. Patents granted or pending in other Industrial Countries.

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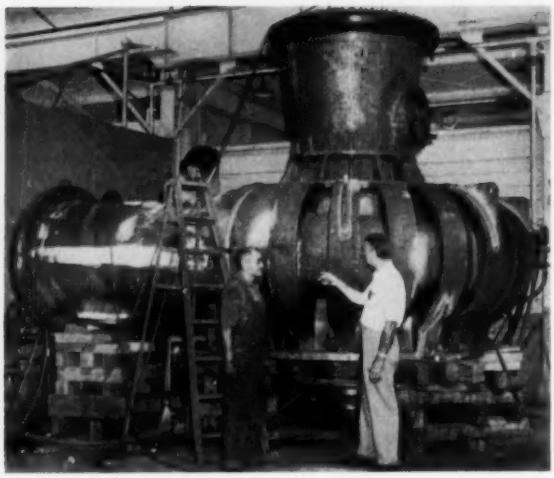
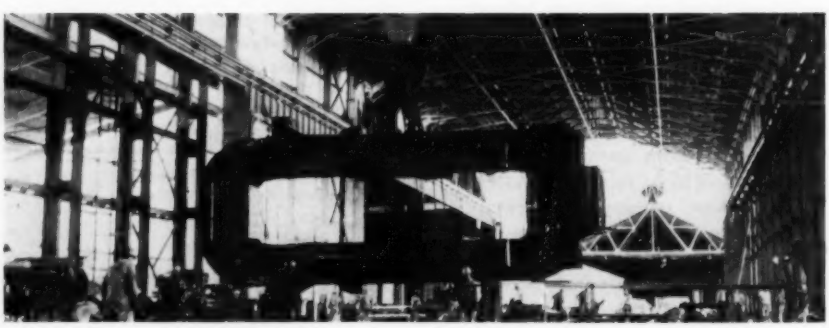


19-TON PUMP CASES: The centrifugal pump shown here is one of a number installed in pumping stations of the Colorado River Aqueduct System. The case is a 19-ton steel casting with 10-ft OD and a diameter of more than 14 ft over the discharge section. All of the cases for pumps now in operation were cast at the Torrance, Calif., plant of National Supply Co. Each was cast in a molding pit and required 89 separate cores. National Supply also made the stainless steel impellers for the pumps. They are 78 in. in diam, weigh 9250 lb

NEW LIGHT SOURCE: A future new source of light production, these cells of electroluminescent plastic are undergoing life testing in a dry box. Essentially, such a cell is a layer of phosphor between two electricity-conducting surfaces, one of them transparent. Voltage applied across the cell charges it and makes the phosphor emit light. The young lady is Miss Helen Mikulski, measurement engineer in the new General Electric Lamp Research Center, Nela Park, Cleveland

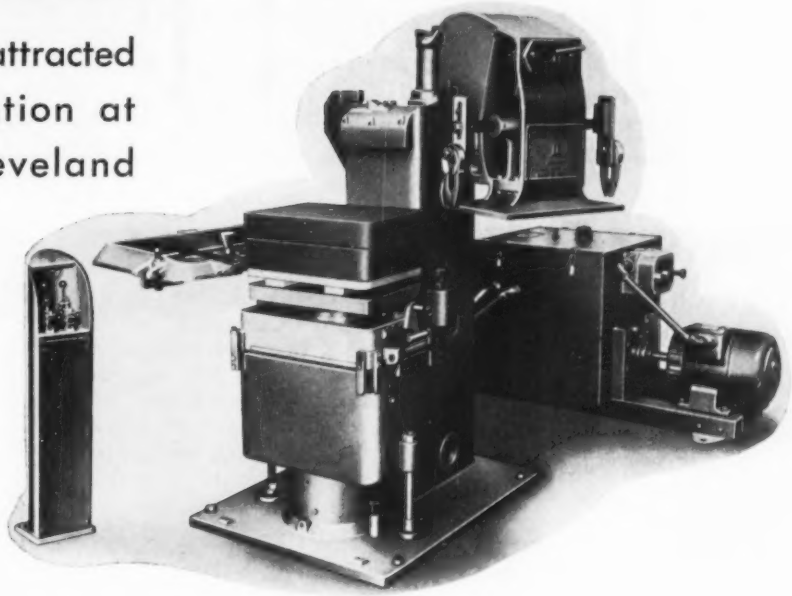
ALUMINUM CRANE: According to Reynolds Metals Co., Richmond, Va., this view shows the largest overhead aluminum crane in the world moving a 200-ton housing for the world's largest aluminum hot rolling mill, at Reynolds' plant in Sheffield, Ala. The crane's rated capacity is 150 tons. It had only a fraction of an inch momentary deflection as it lifted the housing, engineers said



H.E.B.

HYDROIL-ELECTRIC FLASKLESS MOLDING MACHINE

The Machine which attracted your special attention at Foundry Show, Cleveland May 1958.



H.E.B. IS THE ONLY MACHINE OF ITS TYPE IN THE WORLD—

IT FEATURES:—

✱ **One man operation . . . . .**
produces complete flaskless mold (cope and drag made simultaneously) in 35/40 seconds—up to 100 molds per hour.

✱ **Two standard mold sizes . . .**
17″ x 12″ on H.E.B.1 and 18″ x 14″ on H.E.B.2 for high speed production of light castings using double face pattern plates.

✱ **3 Second pattern change . . .**
lift out and drop in new plate!

✱ **Core setting . . . . . .**
one easy movement.

✱ **Independently powered . . . .**
high pressure vane type oil pump unit with remote control.

✱ **Minimum maintenance . . . .**
oil operation in closed circuit; non-rusting, non-freezing; no long pipe lines; no pressure loss.

Send for Bulletin 151/NA for full description and diagrams showing unique operating principles.

U.S. Pat. Pending; Canadian Pat. No. 531479; British Pat. No. 748551. Patents granted or pending in other Industrial Countries.

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F. E. (NORTH AMERICA) LTD.

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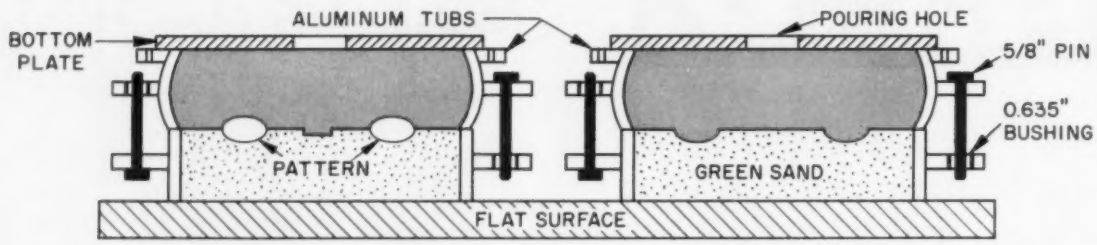
TELEPHONE: BELMONT 3-3227

TELEGRAMS: EQUIPMENT, TORONTO

Trouble Shooting

By C. W. AMMEN



Plaster Patterns

Dear Charlie:

We are called on often to make castings for experimental work. The firm we produce these castings for makes all its patterns out of plaster or cast stone. They send a pattern over and want from one to ten pieces, then later 50 or 100. At that point, they change design or drop this item, and they're off to another. We have tried dry sand matches, cast stone matchplates, etc. What's the best way to cope with plaster patterns in such a manner? Cast stone matchplates have a short life with us; unless we remove the jolt valve on the squeezer, someone forgets, and the plate goes bingo. All these jobs are small stuff, but continuous, good work.

Sincerely,
Sam

Dear Sam:

I know what you mean, old man; I've got into the same boat many times.

Plaster or stone patterns are the devil to work loose, and it's hard to keep them intact no matter how much reinforcing is in them. Once I caught, of all things, a plaster pump runner pattern and took it out of the mold in little pieces. I finished the mold with my thumb, a lifter or two, and a double-ender.

A chap I worked with in New Orleans had the darndest collection of plaster patterns you ever saw—fancy key heads, draw pulls, etc. Some of these patterns were very old and impossible to replace if lost or broken. When we had broken a few of them and were going nuts trying to make any time on them, we decided to do something about it. After some snooping around, we found a small captive foundry that made fancy furniture hardware from plaster patterns. They ran off special orders for furniture manufacturers, each buying by design, which changed often.

A master or sample was made of plaster and submitted to the customer. On approval of the sample, the foundry boys made a plaster mold to produce duplicate plaster patterns. They then made up the number they wanted in a flask. They used 12 x 18 x 5 in. flasks. Each flask section was alike. One lug was bushed with a round bushing 0.635 in. ID, and the opposite lug had a standard ⅝-in.-diam pin of suitable length. All sections were interchangeable.

The system was simple. They made up a bunch of aluminum tubs with the same pin and bushing arrangement as the flasks. The tubs had mounting lugs to bolt down to the squeezer table and a lug to take a rapper. A mold was made up very carefully with fine new sand in one of the flasks. No sprue was cut, and the patterns were not removed from the finished mold. Gates, runner, etc., were cut carefully and sleeked. Cope and drag were placed, face up, side by side, on a good flat surface, and one of the aluminum tubs placed on each section. The joint was mudded and each tub filled with plaster or cast stone and struck off level. It's possible to put a wood or metal bottom plate on the tubs, with a suitable hole for pouring the stone or plaster.

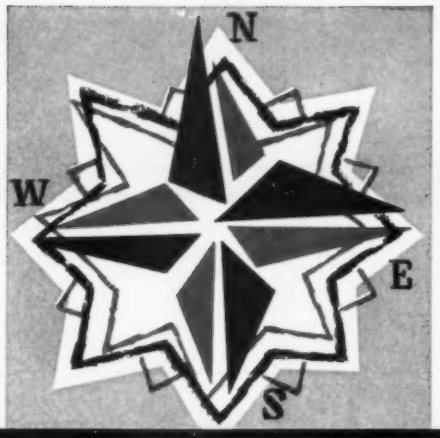
At this point the foundry had a cope and drag mount of stone or plaster which would do the trick. Plaster or cast stone has a very high compressive strength and will hold up very well.

You might follow the same procedure. Get a set of flasks and make up the tubs as needed. We built our tubs of wood and made family mounts of this fellow's plasters. We gave them a coat of shoe polish and let them go.

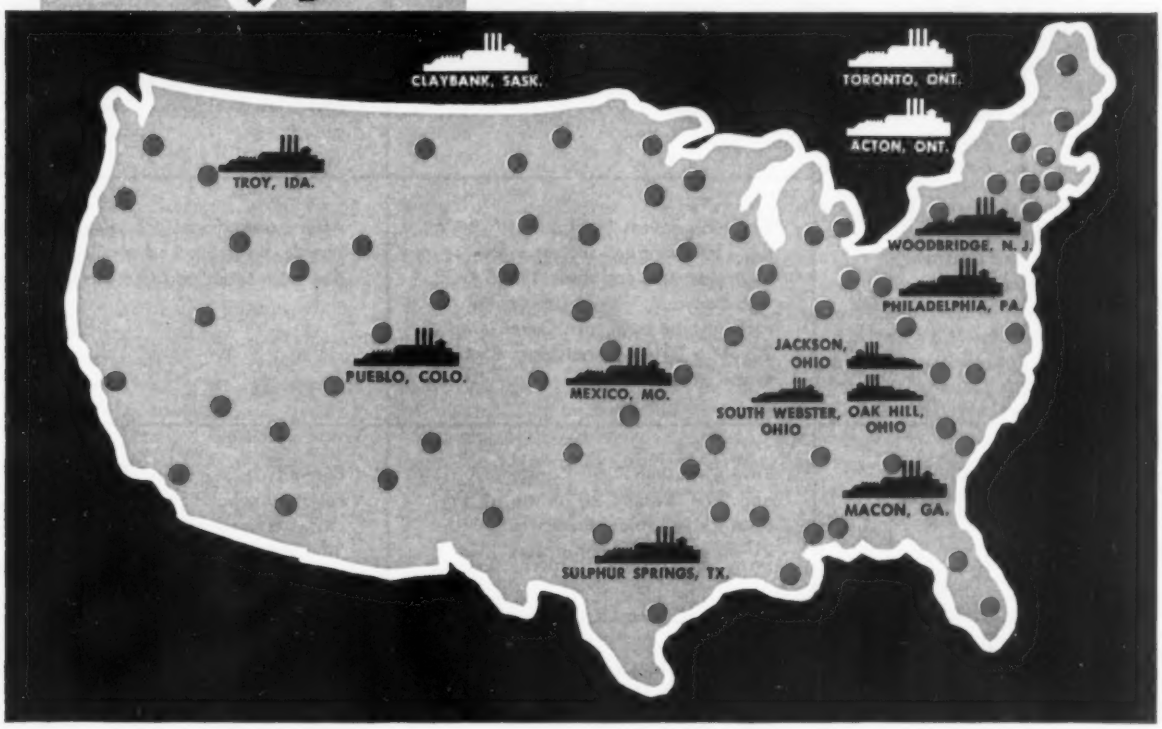
This type of flask equipment is used for symmetrical matches similar to shell patterns. The first off is turned end for end, and the next off is the cope. In your case, you can do the same if there is no reason to save the pattern mounts. After a change you simply use flask sections to make your plaster mounts in place of wood or aluminum tubs.

With this system, the match is good, and it is impossible to put the cope on the drag other than correctly. The disadvantage is that you can use these flasks only for this type of work or loose molding.

Sincerely,
Charlie



A. P. GREEN PLANTS and warehouse stocks conveniently located to save you down time and shipping costs



Manufacturing Plants

Warehouse stocks in principal cities

Your A. P. Green Distributor is Listed In The Yellow Pages of Your Telephone Directory, or write:

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.

A. P. Green REFRACTORY PRODUCTS

PLANTS: Mexico, Mo. — Woodbridge, N. J. — Sulphur Springs, Texas — Jackson, Oak Hill, South Webster, Ohio — Philadelphia, Pa. — Troy, Idaho — Pueblo, Colo. — Macon, Ga.

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A. P. Green Fire Brick Company, Ltd., Toronto 15, Ontario.

13 A. P. Green manufacturing plants and warehouse stocks conveniently located throughout the United States and Canada, Save You Money 7 Ways.

- **Lower Shipping Costs . . . from nearby manufacturing or warehouse point.**
- **Lower Capital Investment . . . your capital is not tied up in warehouse space.**
- **Lower Inventory Costs . . . you need inventory only for *immediate* needs.**
- **Lower Inventory Losses . . . buy on current prices . . . less breakage while in storage.**
- **Increase Production Space . . . free storage space for profitable production.**
- **Lower Labor Costs . . . deliveries to point of usage . . . no inplant moving of stocks.**
- **Maintain Steady Production . . . reduce down time waiting for materials.**

Distributors In The Principal Cities of the World

Circle 624 on Page 53

PROOF: B&W Refractories withstand CO and H_2 prepared atmospheres

ATMOSPHERE	APPLICATION	CONSTRUCTION	RESULTS
60% CO	Pusher Type Malleabilizing Furnace	Walls lined with B&W K-23 Insulating Firebrick backed with B&W K-20 IFB. Roof construction—9′-0″ wide sprung arch of B&W K-23 IFB.	No major rebuilding in 21 years.
40% CO	Radiant Tube Annealing Furnaces Malleable Iron Company	Bases lined with 7″ Kaocrete-A, backed with 6″ Kaolite-20. Base size—21′-9¾″ x 9′-9¼″. Temperature 1550 to 1600 F.	In service 11 years. Reducing atmosphere has no effect on the base. All portable annealing furnace bases in plant lined with B&W castables. *Maintenance costs reduced greatly.*
		Bell type covers lined with 9″ B&W K-23 IFB standard shapes in the arch, side and end walls. 13½″ K-23, with Kaowool, is used around the radiant tube openings. Cover is 22′-6″ x 10′-5½″ outside x 8′-4½″ to top of arch.	After approximately 6 years of service, lining showed no disintegration from reducing atmosphere.
65% CO	Radiant Tube Annealing Furnace	Base lined with 5½″ Kaocrete-A and 3½″ Kaolite-20 on top of 5½″ of block insulation. Base size 21′-9″ x 9′-9″. Temperature 1700 F.	Formerly heavy firebrick linings required rebuilding yearly. B&W castable construction has given more than 9 years' service. Customer standardized on B&W castables.
100% N_2 and 100% H_2	Elevator Type Annealing Furnaces Large Steel Co.	Walls lined with 9″ B&W K-23 IFB plus 3″ K-20 IFB. Furnace size 6′-0″ x 16′-0″ x 4′-0″. Temperatures in excess of 2100 F.	B&W refractories show no sign of deterioration in six furnaces of this type in 3 years' operation. Barring mechanical damage, refractories should give long additional service.
100% H_2	Rectangular Hood Type Annealing Furnaces	60 Furnaces, 24 have wall construction consisting of 18″ B&W K-26 IFB plus 2½″ K-1620 IFB. 36 units use wall of 9″ B&W K-26 IFB plus 5″ K-1620 IFB. Furnace size—12′-0″ x 8′-6″. Temperature 2150 F.	Of the 60 covers in service only 2 were rebuilt after 2 years' service. Plant masonry superintendent reports no shrinkage; estimates 15 years' additional life if not for mechanical abuse.

Consult your B&W Refractories Representative for helpful information on your prepared atmosphere problem.

B&W REFRACTORIES PRODUCTS: B&W Alimul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide • B&W Ramming Mixes • B&W Kaowool

Circle 625 on Page 53

BABCOCK & WILCOX
THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

Men of Industry

● JOSEPH B. LANTERMAN

● CHARLES C. JARCHOW

. . . American Steel Foundries executives

● PAUL H. STUFF

. . . Ross-Meehan v. p.

● GEORGE J. BARKER

. . . retirement announced

● **Joseph B. Lanterman,** former vice president, has been elected president, American Steel Foundries, Chicago. **Charles C. Jarchow,** president since 1949, has become chairman of the board. **Chester E. Grigsby** and **George S. Allen** have become directors. Mr. Lanterman has been with the company over 22 years. Mr. Jarchow formerly served as controller and vice president. **Thomas Drever** recently retired from the board after 49 years of company service.

Donald R. Hepler has been named vice president-manufacturing, Cooper Alloy Corp., Hillside, N. J. He was formerly with A. C. F. Industries Inc., Buffalo.

Richard L. Downing recently joined Stroh Die Casting Co., Milwaukee, as sales manager. He was formerly with Globe Imperial Div., Ainsworth-Precision Castings Co., Rockford, Ill.

Harold Brown, for the past year assistant manager of technical sales service, Walworth Co., New York, has been named general sales manager.

Frank Lopez has been appointed vice president, **Frank McCorry** vice president-plant manager, and **Jack Murray** vice president - production, Boston Electro Steel Casting Inc., Boston.

● **Paul H. Stuff** has been elected executive vice president, Ross-Meehan Foundries, Chattanooga, Tenn. Until recently chief metallurgist, he joined the company in 1925 as a chemist. In 1951 Mr. Stuff received the T. & O. Medal of the Steel Founders' Society of America for outstanding leadership and contribution to the industry. He had been a member of the society's technical research committee since it was established in 1943.

A. Le Thomas, managing director, Centre Technique des Industries de la Fonderie (French foundry industries technical center), and founder chairman of the National Association for Technical Research in France, recently was promoted to commander of the Legion of Honor.

Wilmot F. Wheeler Sr. has resigned as chairman of the board, American Chain & Cable Co., New York, after eight years in that position. Previously he was president. **Wilmot F. Wheeler Jr.,** formerly vice president, has been named executive vice president. **Cyrus N. Johns** is president.

J. K. Gannett retired Jan. 1 after 43 years with the Austin Co., Cleveland. Since 1944 he served as vice president in charge of all engineering and research for the engineering and building company.

● **George J. Barker,** professor of metallurgical engineering, University of Wisconsin, has retired after 37 years in the department of mining and metallurgy. A graduate of the university, he has been a faculty member since 1921, and from 1943-50 was chairman of the mining and metallurgy department. Prof. Barker was active in the Foundry Educational Foundation, and various other technical and educational groups. A former president of the Wisconsin Chapter of the AFS, he served as Education Division chairman of the society and in 1953 rereceived an honorary AFS life membership in recognition of promotional work in the field of foundry education.

Clyde Williams, president, Clyde Williams & Co., Columbus, Ohio, was selected to receive the James Douglas Gold Medal of the American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. Mr. Williams was formerly president, Battelle Memorial Institute, Columbus, Ohio, and served as president of AIME in 1947.

George N. Wright, formerly with Harsch Bronze & Aluminum Foundry, Cleveland, has joined Solon Foundry Inc., Solon, Ohio, as director of sales, succeeding **Harry F. Davis,** who will represent the company in the greater Cleveland area.

● **WILLIAM B. ILKO**
. . . Wright sales mgr.

● **LESLIE N. SCHUMAN**

● **CHARLES SCHNEIDER**

. . . National Malleable & Steel promotions

● **ALLEN H. JONES**
. . . Sly Mfg. Co. v. p.

For many years Mr. Wright was chairman of the Foundry Division of the Aluminum Association.

● **William B. Ilko,** in addition to his duties as sales manager, American Chain Div., American Chain & Cable Co., York, Pa., has been appointed sales manager of the company's Wright Hoist Div., succeeding **S. J. Woodworth. T. J. Winter** has been named field sales manager for Wright Hoist Div.

● **Donald L. Price** has been elected a vice president, Norton Co., Worcester, Mass. **Robert Cushman** succeeds Mr. Price as sales manager of grinding wheels, Abrasive Div. **Harry G. Brustlin,** West Coast district manager in Los Angeles, has returned to Worcester to succeed Mr. Cushman as manager of marketing services. **Sidney B. Wetherhead** was made Pacific Coast district manager, with headquarters in Los Angeles. He has been manager of distributor sales promotion since 1956.

● **Leslie N. Schuman** has been named head of the new product engineering department, Industrial Div., National Malleable & Steel Castings Co., Cleveland. **Charles Schneider** has succeeded him as general superintendent of Cleveland Works. Mr. Schuman joined National in 1927. He has been general works superintendent since 1946. After he joined the company 12 years ago Mr. Schneider was assistant chief inspector and became a sales representative in 1952.

Edward S. Valentine, formerly with Reichhold Chemicals Inc., White Plains, N. Y., has been appointed western states manager of foundry core binder sales, O. L. King & Co., San Francisco.

J. Thomas Swift has been appointed assistant general sales manager, Baker Industrial Trucks, division of Otis Elevator Co., Cleveland. Mr. Swift, formerly New York branch manager, joined the company in 1953.

● **Allen H. Jones** has been elected vice president, sales and engineering, W. W. Sly Mfg. Co., Cleveland. Formerly Chicago district manager for Sly, recently he has been director of engineering.

Fred J. Walls, a director of Engineering Castings Inc., Marshall, Mich., since its inception in 1946, has been elected vice president-research and development. Until his retirement last year, Mr. Walls was manager of the Detroit Technical Section, International Nickel Co., New York. His residence continues at 5669 Shore Dr., Orchard Lake, Mich.

Robert N. Janeway, consulting engineer, Detroit, has become vice president-engineering, Consolidated Foundries & Mfg. Corp., Chicago.

R. E. Lenhard, executive vice president, was named president, Air Reduction Sales Co., succeeding **J. H. Humberstone,** who has become vice president, Air Reduction

● **HARRY G. BRUSTLIN**

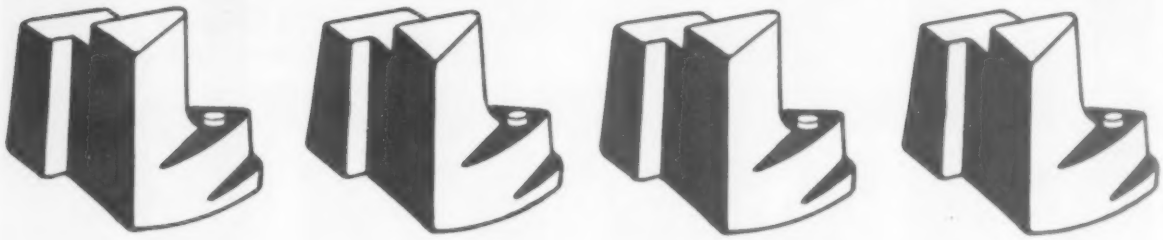
● **DONALD L. PRICE**

● **SIDNEY B. WETHERHEAD**

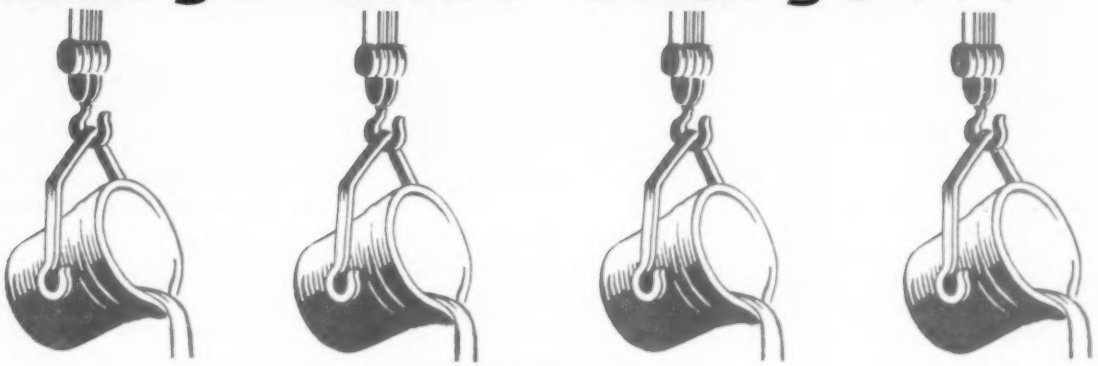
● **ROBERT CUSHMAN**

. . . new appointments announced by Norton Co.

You get uniform castings



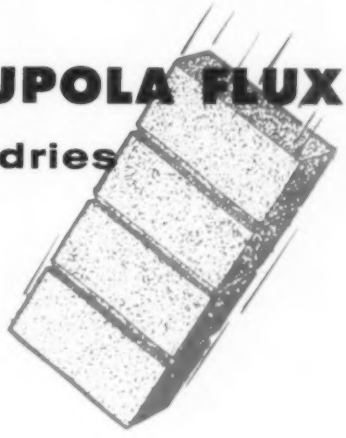
charge after charge . . .



with *Famous* CORNELL CUPOLA FLUX

for Gray Iron and Malleable Foundries

"often imitated but never equalled"



When you use Famous Cornell Cupola Flux, you assure yourself of a number of important benefits. You get cleaner metal and better slag control. Famous Cornell Flux initiates greater fluidity and controlled melting. Metal composition is improved and castings are easier to machine thereby reducing rejects. Cupola linings receive a protective glaze from Famous Cornell Flux and there is consequently less labor, repair cost and cupola downtime. In addition, sulphur is greatly reduced.

IF YOU MELT **ALUMINUM, COPPER OR BRASS...Try *Famous* CORNELL Aluminum, Copper or Brass Flux**

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Now Representing The Cleveland Flux Company in New England

Write for Bulletin 46-A

The* CLEVELAND FLUX *Company

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

● EDWARD A. LORIA
. . . Climax development mgr.

● WILLIAM E. THOMAS
. . . assistant to v. p.

● ROY F. NOSEK
. . . B & P director of sales

● HARRY G. SCHLICHTER
. . . retiring from B & P

Co., New York. **Dr. Albert Muller,** assistant to the president of the sales company, has been appointed vice president.

● **Edward A. Loria** has joined Climax Molybdenum Co., Div. of American Metal Climax Inc., New York, as development manager, high-temperature and corrosion-resistant alloys, with headquarters in Pittsburgh. He was formerly metallurgical engineer with Crucible Steel Co. of America.

John H. Bruemmer has been named general accountant, Hamilton Foundry & Machine Co., Hamilton, Ohio. He joined the company's accounting department last year.

● **L. G. Probst** has been named vice president and eastern district manager, National Engineering Co., Chicago. **W. A. Kellogg,** who supervised the district for many years, will continue as a vice president and consultant on foundry planning and materials handling. Mr. Probst, who joined the company in 1945, was formerly assistant sales manager and a district sales manager for the midwest and south.

● **William E. Thomas,** since 1955 manufacturing assistant, United Engineering & Foundry Co., Pittsburgh, has been made assistant to the vice president-operations. He joined the company's Youngstown, Ohio plant in 1940.

● **Raymond G. Reiff** has joined American Metallurgical Products Co., Pittsburgh, as foundry service manager. Until recently he was supervisor of the quality control laboratories, Ford Motor Co.'s Dearborn Iron Foundry.

● **Jane A. MacTaggart** has been appointed sales representative in New York and eastern Pennsylvania, Samuel Greenfield Co., Buffalo, N. Y., nonferrous metal smelters. Her headquarters are at the Buffalo office.

● **Harry G. Schlichter,** vice president-sales, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, will retire Mar. 31, after 38 years of service. Named sales manager in 1944, he has been vice president-sales since 1951. **Roy F. Nosek,** for the last two years sales manager, will be director of sales for the division. **Glenn Turner** has been named manager of marketing, assisted by **Lloyd Shanks.** The following have been named divisional sales managers: **George Koren,** sand and shell processing machinery; **George Miller,** coremaking and molding machinery; **Hank Rach,** slinger machinery; and **Cliff Wenninger,** reclamation and accessory equipment. Mr. Wenninger continues as technical director.

● **Lovell Shockey** has been appointed sales manager, Cleveland Works, National Malleable & Steel Castings Co. He succeeds **Donald L. Griffith,** who held the position since 1942 and who has been made sales co-ordinator for the Industrial

● L. G. PROBST
. . . v. p. National Engineering

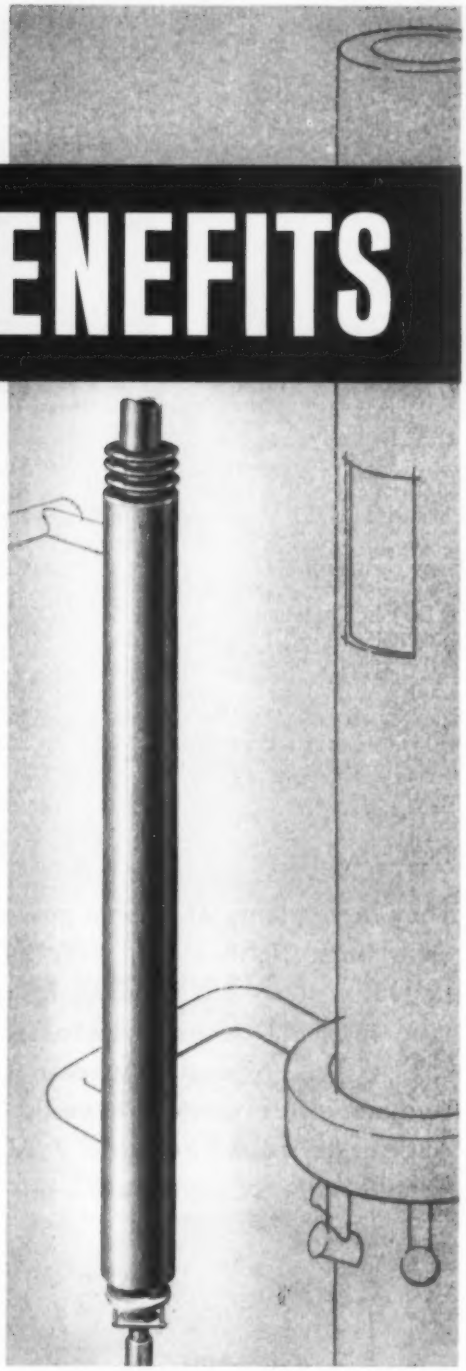
● RAYMOND G. REIFF
. . . foundry service mgr.

● JANE A. MacTAGGART
. . . Greenfield Co. sales

● LOVELL SHOCKEY
. . . becomes sales mgr.

Foundries with limited operations now enjoy

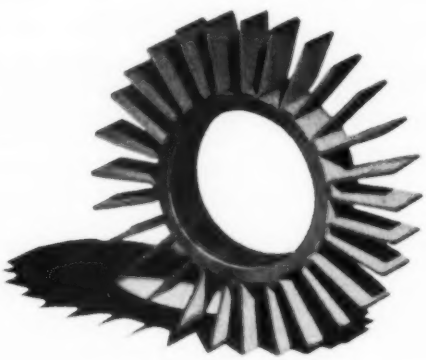
HOT BLAST BENEFITS



Now for the first time, the well-known coke, silicon, metal and alloy savings available with hot blast can be obtained by any foundry—no matter what the size. The Brown Thermal Products Corporation has designed an economical air preheater especially for the foundry with limited operations. To heat 2,000 C. F. M. of air to 600°F. with a hot blast heater costs as little as $6,000.

The low cost Brown unit is made possible by the Brown Fintube. With 8 to 10 times the heat transfer surface of other hot blast tubes, this compact tube permits the design of less bulky equipment.

If you are a foundry with limited operations and want the same hot blast advantages of large foundries, write today. Obtain a copy of our Foundry Cupola Survey Form. Find out your estimated savings. Heaters are engineered and designed for larger air volumes and higher temperatures.



Greater Heat Transfer Surface Area from Brown Fintube ... Longitudinal U-shaped channels, resistance welded to the hot blast tubes, permits up to 800% more surface for heat transfer per lineal foot of tubing.

Thermally designed and manufactured by heat transfer engineers with 20 years experience

For further information write for Foundry Cupola Survey Form

HEAT EXCHANGE SURFACE
BROWN THERMAL PRODUCTS

THE BROWN THERMAL PRODUCTS CORP.

Subsidiary of Brown Fintube Company

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Circle 627 on Page 53

● **DONALD S. DALTON**
. . . joins Thiem Products

● **A. FRED MORRIS JR.**
. . . Morgan sales mgr.

● **JOSEPH G. KROPKA**
. . . heads casting sales

● **R. H. WILSON**
. . . rejoins American Hoist

Div. Mr. Shockey has been development engineer of the division since he joined the company in 1956. Mr. Griffith became a company chemist in 1922.

● **Donald S. Dalton,** until recently with Belle City Malleable Iron Co., and Racine Steel Castings Co., Racine, Wis., has been named sales representative, Thiem Products Inc., Milwaukee, in northern and central Indiana and western Michigan.

● **A. Fred Morris Jr.** has been named sales manager, Morgan Engineering Co., Alliance, Ohio. He joined the company in 1938, was transferred to sales in 1946, and became a director in 1954.

J. Gregory Tierney has been appointed sales representative in the Indiana, southern Illinois, and western Kentucky territory for Leschen Wire Rope Div., H. K. Porter Company Inc.

● **Joseph G. Kropka,** in addition to his duties as manager of foundries, Chain Belt Co., Milwaukee, has been put in charge of casting sales. With the company since 1935, he previously served as malleable foundry superintendent.

● **R. H. Wilson** has been appointed assistant manager of the foundry division, American Hoist & Derrick Co., St. Paul. After graduation from the University of Minnesota, he joined American Hoist as a metallurgist. In 1954 he became a sales engineer with Electro Metallurgical Co., and most recently was Chicago district manager for that company.

Wainwright Holt Jr. has been appointed sales manager of centrifugal and axial compressors, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Holt has been with the New York office of the company since 1951.

Paul W. Norris, vice president-general manager, Denison Engineering Div., American Brake Shoe Co., Columbus, Ohio, has been named president of the division. **W. C. Denison,** former president, is chairman of the division and will continue as a vice president and director of American Brake Shoe.

Rayburn E. Orr has joined Gregg Iron Foundry, El Monte, Calif., as sales engineer for the company and its subsidiary, Reliance Foundry Co., Alhambra, Calif.

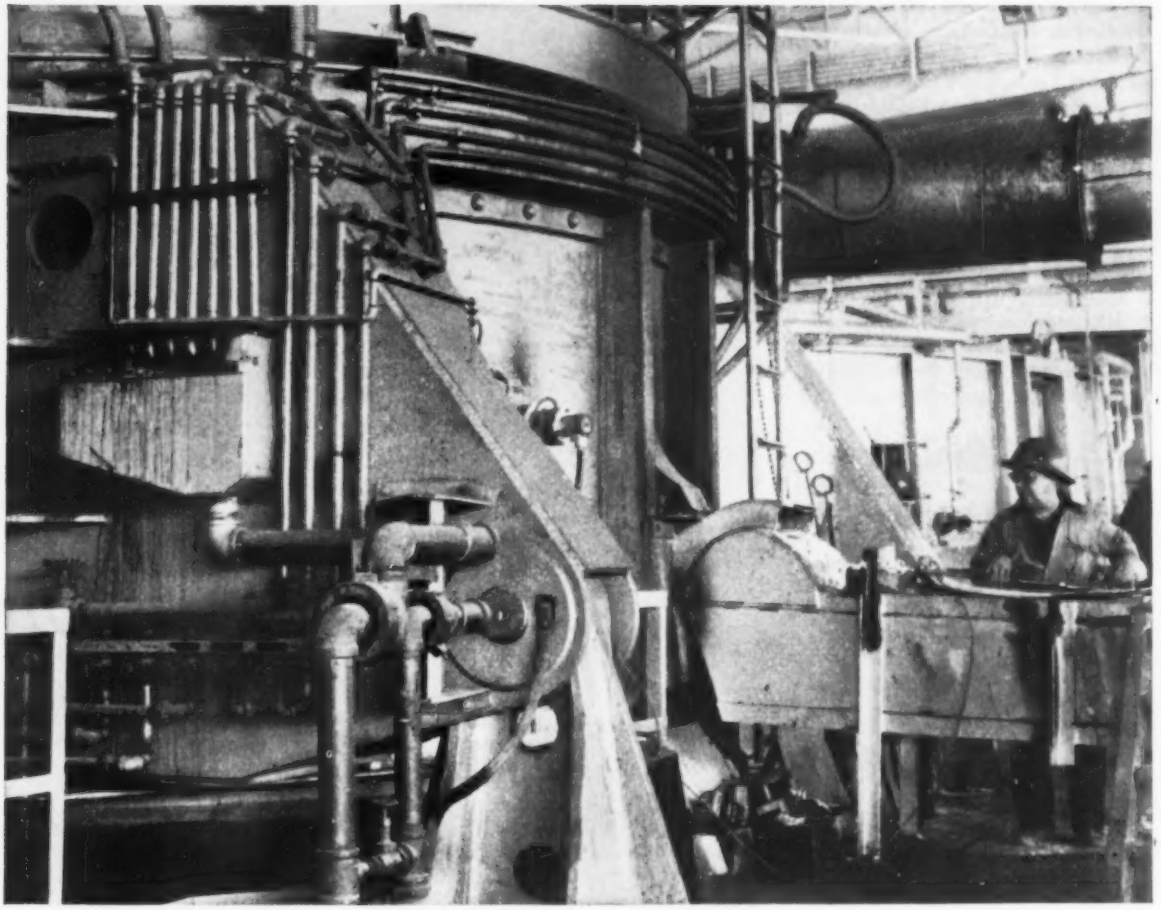
Gilbert L. Cox has joined Whitehead Metals Inc., subsidiary of International Nickel Co., New York, as technical manager, with head-

AIRETOOL pneumatic grinders cut metal removal costs. They have plenty of reserve power to tackle tough jobs, save time. Lightweight, perfectly balanced, they maneuver easily — no operator fatigue. AIRETOOL makes two models of horizontal pneumatic grinders **6" and 8" wheels, for 6000 and 4500 rpm; two models of heavy-duty vertical grinders for** **6" abrasive wheel and 7, 8 or 9" disc wheel. Write for Catalog 67.**

REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, South America, England, Puerto Rico, Italy, Japan, Hawaii

CANADIAN PLANT: 37 Spalding Drive Brantford, Ontario

EUROPEAN PLANT: Vlaardingen The Netherlands



From the World's Largest Copper-Melting Electric Furnace

TOP QUALITY CASTINGS... ROCK BOTTOM COSTS

Whiting Hydro-Arc Electric Furnace at the Perth Amboy, N. J. plant of American Smelting and Refining Company pours a ton of copper every two minutes—24 hours a day, 7 days a week. Operating costs are competitive, even in this area of high-priced electric power.

Hydro-Arc offers you the *precise* temperature control that assures a top quality product—be it copper, iron, steel, or any other metal or material. You will save money, too, because continuous melting boosts production . . . top-charging reduces downtime . . . simplified design cuts maintenance costs . . . and Hydro-Arc costs less installed than other equipment of equal capacity. For prime melting or duplexing get the facts on Hydro-Arc.

SEND FOR NEW 8-PAGE BULLETIN EF-100

telling all about the electrode arm and clamp which floats on a cushion of air and which is clamped by a cushion of air. Booklet is fully illustrated. *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.*

Member of the Foundry Equipment Manufacturers Association

75th Year

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

WHITING

FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILE; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT

Circle 629 on Page 53

quarters in Rochester, N. Y. He has been with Inco's Development and Research Div., there. Mr. Cox joined the company's Bayonne, N. J., research laboratory in 1931.

Ralph M. Johnson has retired as director of sales, Norton Co., Worcester, Mass. He continues as a director and vice president, and will act as a consultant for a year.

• **Richard Neufeld,** formerly assistant sales manager, has been named sales manager, U. S. Reduction Co., East Chicago, Ind. He has been

● RICHARD NEUFELD
. . . U. S. Reduction sales mgr.

with the company since 1948 and is an active member of the AFS and the Society of Diecasting Engineers.

John H. Schuler has been named vice president-general manager, Anderson Electric Corp., Birmingham.

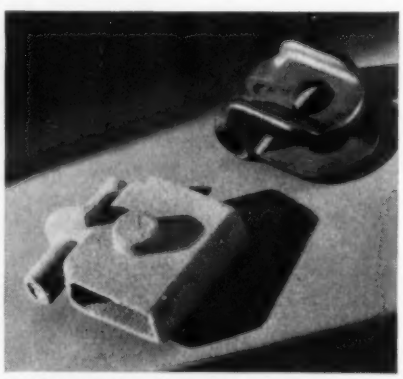
Albert F. Pfeiffer has been appointed consultant, foundry and pattern shops, West Allis Works, Allis-Chalmers Mfg. Co., Milwaukee. He was a patternmaker with Dickson Mfg. Co., Scranton, Pa., when it was acquired in 1906 by Allis-Chalmers and has been with the one company during his foundry service. **Harry S. Evans,** assistant superintendent, has succeeded Mr. Pfeiffer at West Allis as superintendent of pattern shops. Other foundry and pattern shop appointments include: No. 2 foundry, **Frank J. Bacun,** superintendent; No. 1 foundry, **Ward L. Olson,** superintendent, and **Elmer H. Biersack,** assistant superintendent. **William J. Schmidt,** brass foundry superintendent; **Arthur G. Knudsen,** assistant pattern shops su-

See an opportunity shaping up in this shell core?

Are you passing up jobs you *could* handle —if you had the shell-coring facilities?

This coupler for a farm tractor is an example of just such a job. It couldn't be cast by conventional methods. Tolerances were too tight. As first designed, it had to be *welded* together—involving four separate pieces and seven costly operations.

Now the people at Northern Malleable Iron Company, St. Paul, Minn., are producing it as a one-piece casting—a casting that looks better and *costs roughly 25% less* than the original welded assembly. Its secret: a design change and two shell cores bonded with Durez resins. One core is shown at right.



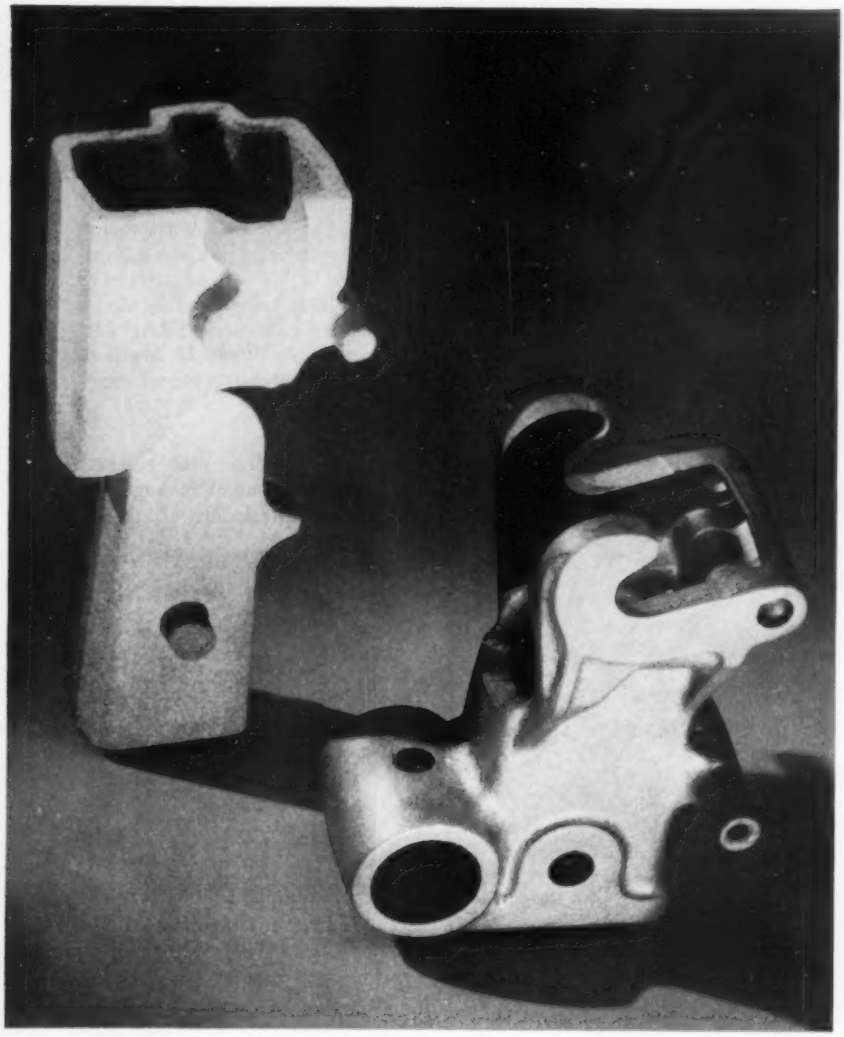
ANOTHER PART redesigned for shell process at Northern Malleable. The former design employed two cores one of which required core dryers.

These resin-bonded cores preserve the sharp detail of the design. They provide a smooth interior surface on the metal. They allow the foundry to hold dimensions accurately. Tolerances on critical sections are well within the customer's requirements.

The profitable "why" of shell cores

When you make shell cores, you get the speed and accuracy of shell molding, plus these special advantages:

1. You eliminate the need for core dryers, and consequent warpage. Heat transfer from the core box into the sand-resin mix is uniform over the entire core surface.
2. You buy less sand, handle less sand. Cores are lighter, easier to handle.
3. You get better castings, because less gas is produced; gas escapes easily; core holds the metal until it contracts, then core collapses to allow stress-free metal cooling.



SHELL CORES at Northern Malleable foundry are bonded with *Durez 18115 Resin Solution* teamed with *Durez 18117 Accelerator*. This combination gives the right amount of hexa and wax for greatest tensile strength, best possible curing characteristics, and rapid drying when cold-coating sand.

What to do about it

There's a complete family of Durez foundry resins to help you get these results consistently. Your Durez technical man can recommend the resins best suited to your foundry methods. He draws on 38 years of resin experience, plus extensive foundry training, to bring you the answers you need when you need them. For competent help on shell molding and coring, call him in now.

HERE'S THE LASTEST on shell molding and coring—authoritative up-to-the-minute data on patterns, materials, mixing, temperatures, lubricants, molds, cores. It's the new 36-page "Durez Guide to Shell Molding." Write for your free copy today.

DUREZ PLASTICS DIVISION
HOOKER CHEMICAL CORPORATION

1003 Walck Road
North Tonawanda
New York

HOOKER CHEMICALS PLASTICS

perintendent; **Henry J. Napierala**, superintendent, and **Albert J. Huebner**, general foreman, timestudy and planning; **Henry M. Clouse**, industrial engineer, foundry maintenance and engineering department.

Al Hunter, for two years chief development engineer of coremaking and molding machines, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, has been named manager of engineering. He was formerly with Dominion Engineering Works, Montreal, Que.

• **Foster W. Lamb** has been named general sales manager, Chicago Hardware Foundry Co., North Chicago, Ill., and will supervise sales for all the company's divisions. Mr. Lamb formerly was with Automatic Transportation Co., division of Yale & Towne Mfg. Co., and Colorado Fuel & Iron Corp.

• **FOSTER W. LAMB**
. . . foundry sales manager

Keith E. Hall, general manager of industrial market sales, has been named vice president, Reynolds Aluminum Sales Co., Richmond, Va.

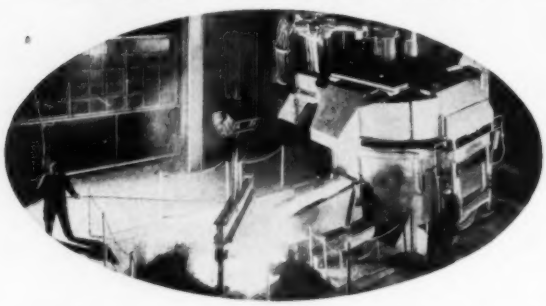
Clarence E. Griese has been elected president-general manager, Ohio Hoist Mfg. Co., Lisbon, Ohio. **Reese Lewis**, who has been vice president-general manager, has retired. **Joseph F. Wise** was named secretary, and **Arvil C. Richard Jr.**, treasurer.

Dr. Nestor A. Bassino, professor of metallurgical engineering, National University of Argentina, and also with a civic laboratory in Buenos Aires, will devote several months

Circle 630 on Page 53

WHEELABRATOR'S WIDE-ANGLE VIEW

stifles the most stubborn electric furnace fume



In 27 prominent steel foundries and plants, Wheelabrator Dustube® Collectors handle a combined total of over a million c.f.m. of air, from 48 electric furnaces.

From the vantage point of this experience, Wheelabrator takes a "wide-angle" view of electric furnace fume control, to solve the most formidable problems of furnace hooding and ventilating, fume collection and disposal. Wheelabrator Dustube systems regularly achieve collection efficiencies above 99% and give a clean discharge. Take advantage of Wheelabrator's unmatched knowledge of electric furnace fume control.

Write today for complete information. Wheelabrator Corporation, 505 S. Byrkit St., Mishawaka, Indiana.

A Sound-Color Film on Electric Furnace Fume Control is available for showing to interested firms. Write for details.

DUST and FUME CONTROL

to study of shell molding at Central Foundry Div., GMC. He is on a scholarship from the Argentine government.

John J. Willis and **A. B. Ullrich Jr.** have been named regional managers, American Air Filter Co., Louisville, Ky. As midwest regional manager with headquarters in Chicago, Mr. Willis will continue as manager, Illinois Engineering Co., a manufacturing division of AAF. Mr. Ullrich succeeds **Morris G. Munson**, retired, as southern regional manager.

• **George Ramsden** was recently made assistant general manager for the North Central Div., Link-Belt

• **GEORGE RAMSDEN**
. . . assistant general mgr.

Co., Chicago, with headquarters at the Minneapolis plant. With the company since 1947, he has been at the Pershing Rd. plant in Chicago since 1955.

R. H. Porterfield has been appointed manager of industrial sales in the New York district, Allis-Chalmers Mfg. Co.'s industries group. **W. T. Farnsworth** succeeds Mr. Porterfield as Hartford, Conn. district manager. **E. E. Strickland**, manager of industrial sales in the New York district, has become manager of general products division sales in the northeast region, based in New York.

A. C. Hinz has been named supervisor of sales and engineering, Ross Operating Valve Co., Detroit, for southeastern Michigan.

B. Arthur Russell, since 1953 executive vice president, has been elected president-treasurer, Drying

MELTRITE PIG IRON

Always in

Dependable Supply

The entire production is *for sale* at all times.

Strictly merchant, Meltrite is made to the required analysis to meet specifications for many different grades.

More Meltrite is used than any other merchant pig iron.

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Erie • Greensboro • Indianapolis • New York
Pittsburgh • St. Louis • Washington

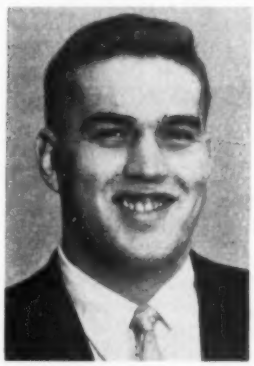
IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

Circle 632 on Page 53

Systems Co., Div. of Thor Power Tool Co., Chicago. **Buford B. Russell,** former president-general manager, becomes chairman of the board.

William J. Anderson, formerly direct factory representative, Macwhyte Wire Rope Co., Kenosha, Wis., has been named regional sales manager in the midwest and eastern territories of the company, with headquarters in Kenosha.

• **Lee Paddock** was appointed foundry sales representative in northeastern Ohio, Frederic B. Stevens Inc., Detroit, succeeding



• LEE PADDOCK
. . . *Stevens sales*

Frank Balsley, retired. Mr. Paddock, recently with Ford Motor Co., will make his headquarters in Cleveland.

James L. Patterson and **James W. Higley** have been appointed district representatives in Philadelphia and Buffalo, respectively, for Foundry Equipment Co., Cleveland.

Edward J. Wellauer, since 1950 assistant chief engineer-materials and research, Falk Corp., Milwaukee, has been named director-research and development.

John P. Gaeth, since 1952 treasurer and assistant secretary, Osborn Mfg. Co., Cleveland, has been appointed vice president-treasurer of the company.

Emil A. Axelson, formerly with Bethlehem Steel Co., has joined the refractories division, H. K. Porter Co., Pittsburgh, as sales representative there.

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For Over Half a Century the

Highest Quality Foundry Coke

Consistently high in carbon and low in sulphur and ash . . . highly resistant to shatter and abrasion, Milwaukee Solvay has hundreds of satisfied users. It has remained the foundryman's choice for *over 50 years.*

If you are not already a user, may we ship you a *trial* car?

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IRON ORE • PIG IRON
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Circle 633 on Page 53

Hot-Blast Cupola Operation

. . . Two Case Histories

● ECONOMIES and advantages in use of hot blast equipment with the foundry cupola generally are well known. Principal savings are in the reduction of coke consumption, smaller additions of silicon and manganese, and substitution of scrap for part of the usual pig iron charge.

Operating data were released recently by two foundries which installed externally fired hot blast equipment a short time ago. In one case the cupola also employs water cooling. The hot blast units were furnished in both instances by the Brown Thermal Products Corp., subsidiary of Brown Fintube Co., Elyria, Ohio.

The W. O. Larson Foundry Co., Grafton, Ohio, went to water-cooled operation several years ago, primarily to increase the melting rate of its cupola. Removing most of the lining increased the inside diameter from 54 in. to 62 in.

The water-cooled shell later was supplemented by water-cooled protruding tuyeres. While no reduction was effected in quantity of coke required per charge (coke ratio was 6½ to 1), the foundry was able to reduce the pig used in its Class 40 iron castings by 60 per cent.

Improved Efficiency — More recently the company installed hot blast equipment. According to W. O. Larson Jr., president, this combination of water-cooled cupola, protruding tuyeres, and hot blast is about the ultimate in control and efficiency. The hot blast unit has five, vertical, stainless steel, heat exchanger tubes connected in parallel. It is gas fired and has a capacity of 6000 cfm at 1000° F.

With 800° F air at the tuyeres, it was possible to reduce the coke bed by 20 per cent; coke splits were cut 23 per cent, and coke ratio was increased to 9½ to 1. Although pig iron in Class 40 iron was eliminated and more steel scrap used, carbon content and graphite flake size were unchanged. Reduced height of burnout cut the amount of patch required daily and the number of manhours needed to prepare the cupola. With the hot blast and lower coke consumption, the blast volume was reduced 20 per cent to obtain the same melting rate as previously.

The company reports these savings: $12 per heat in bed coke or $2900 a year based on a 20-heat month; $15 per day in patch or $3600 a year; $6.30 a ton in melting the iron ($1.30 in coke and $5 in metal). Based on 500-ton months, annual savings would total $44,000. Cost of the installation was $9100 for the water cooling and $51,000 for the hot blast. Percentage savings are 60 per cent in cupola patch, 27 per cent in coke consumption, and 10 per cent in metallic charge cost.

There has been insufficient time to determine maintenance costs accurately but they are not expected to be high. Gas consumption is about 500 cu ft per ton at a cost of 62 cents per 1000 cu ft.

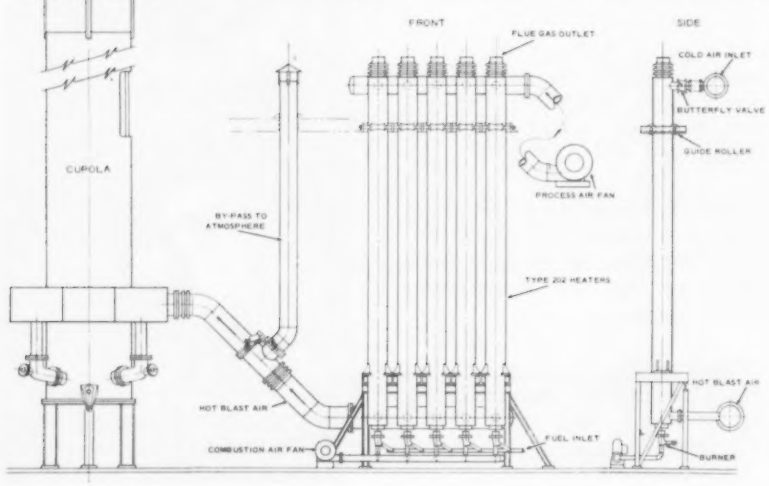
Three-Tube Heater—The Anthes-Imperial Co. Ltd., Edmonton, Alberta, Canada, operates a cupola lined to 44 in. equipped with a three-tube Brown heater for supplying 3500 cfm of air at an operating temperature of 550° F. Gas consumption by the heater is 2800 cu ft per hour.

After several months' operations it reports total cost savings of approximately $3.50 a ton of iron. The savings come from these sources: Reduction of 10 in. in bed height and 28 per cent less coke between charges; 60 per cent saving in silicon additions; 50 per cent saving in soda ash used for desulfurizing; 100 per cent saving in manganese additions; 1 per cent less melt loss; increased lining life of cupola and mixing ladle.

Hot blast equipment in both of these installations is the type shown in the accompanying illustration. It is designed for the small and medium-sized foundry and can be made up of varying numbers of heaters. Additional heaters can be interconnected in parallel and operated together to produce greater capacity as the foundry expands.

This type of preheater employs finned combustion tubes which substantially increase heat transfer per linear foot of tubing and minimize the space required for the heaters.

Hot blast equipment for small or medium-sized foundry



AO 750 GOGGLE CLEANING STATION

Very handy, very practical. Compact cabinet of selected hardwood, 12" x 9" x 6", supplies all needed cleansing and anti-fog materials plus disposal area. Quickly attaches to wall. Complete with 6 oz. bottle and sprayer, 2 boxes of cleaning tissue, one 1 oz. jar anti-fog paste. AO Super-Clear Antifog Fluid available for cabinet also.

AO SENTRY-LITE (200X)

Operates Instantly, Automatically when Power Fails!

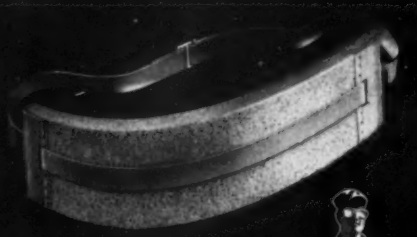
Illuminates 10,000 sq. ft. for 12 hours or more in emergency . . . aids safety and production, helps prevent panic, pilferage. Shuts off automatically when power resumes. Battery needs water only once a year. Portable, splendid auxiliary light!

AO 372-8 STRAIGHTAWAY SOUND PROTECTOR

Muffles that Noise — Increases Efficiency

For both high and low frequency noises. New comfort seal prevents costly replacements due to cracking or puncture, maintains same attenuation as previous models, conforms to temples of glasses. Very comfortable, even in cold outdoors. Neoprene covered spring headband assures even pressure and is dielectric. AO sound protectors are comfortable, sanitary and permit audible voice communication.

4 AO SAFETY SPECIALTY PRODUCTS that Pay Off for Foundries!



Hot Weather Coming! It's time to order your

AO 109B SWEATBANDS

Keep workers cooler, safer, more efficient. Sweat can't sting eyes, blur vision or carry foreign matter into eyes. 1¾" wide cellulose — absorbs 16 to 20 times its light ½ oz. weight. Can be washed or sterilized and used again and again. Reinforced at ends to prevent tearing — all rubber adjustable strap.

Your nearest AO Safety Products Representative can supply you

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Circle 634 on Page 53

SAVE

WITH *Acme*

MELTING POTS
INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

Acme FOUNDRY CO.

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Obituary

THEODORE KAUFFMANN SR., 92, chairman of the board and former president, S. Obermayer Co., and its subsidiary, Ramtite Co., both of Chicago, died Jan. 14. Mr. Kauffmann served the company 62 years. He became president in 1911 and chairman in 1955.

Harry W. Impey, 78, for many years one of the best known men in the foundry industry of New England, died Jan. 21 in Glendora,

HARRY W. IMPEY

Calif. Born in St. Johnsbury, Vt., Mr. Impey started work there with the Fairbanks Scale Co. in 1896. Subsequently he spent a few years with Otis Elevator Co., and then joined Tabor Mfg. Co., Philadelphia, in 1907 as New England representative. He served for nearly 47 years in the latter capacity until his retirement five years ago.

William J. Johnson, 79, former foundry superintendent, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., died Jan. 3. He retired in 1954. Mr. Johnson was previously with American Steel Foundries, Sharon, Pa., and Marion Power Shovel Co., Marion, Ohio.

Michael Milonski, 79, former superintendent, American Steel Foundries, Granite City, Ill., died Jan. 13. He retired four years ago after 50 years with the company.

Ron Timms, manager, Welland Iron & Brass Ltd., Welland, Ont., died Jan. 12.

MANHATTAN PORTABLE WHEELS

REMOVE *MORE* METAL AT LOWER COST

Fast cutting action *plus* long wheel life add up to more output per man hour . . . lower production costs with Manhattan Portable Wheels. Every specification of the wheel you use—type of abrasive, grain size, hardness, structure and bond—is determined only after a careful analysis of your grinding problems . . . the amount of metal *you* want to remove, and the finish *you* require.

Workers prefer Manhattan Portable Wheels because they get more pieces done. Management prefers them because they assure faster, more uniform quality production . . . and they last longer.

Flared cup, depressed center, cone, plug and mounted point, or straight—there's a Manhattan Portable Wheel engineered for your job requirements. Ask about the new Safety-Back Flared Cup Wheel. Let a Manhattan representative show you how to remove *more* metal, *faster* . . . get "More Use Per Dollar" . . . with Manhattan Portable Wheels and other types of high speed, heavy duty abrasive wheels.

FASTER CUTTING ACTION

LONGER WHEEL LIFE

CUSTOM-MADE FOR YOUR JOB

RMD40

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

Circle 636 on Page 53

Around the Country

NEWS REPORTS FROM

Chicago . . . Boston . . . Philadelphia . . . Pittsburgh

Philadelphia— While sentiment is a shade better, business of gray iron shops is still spotty. Heavy work continues slow, with die work lagging badly. Printing press, textile equipment, and paper machinery specifications also are slow.

Light and medium work is relatively better, reflecting fairly wide demand, including power transmission components and needs for material handling equipment.

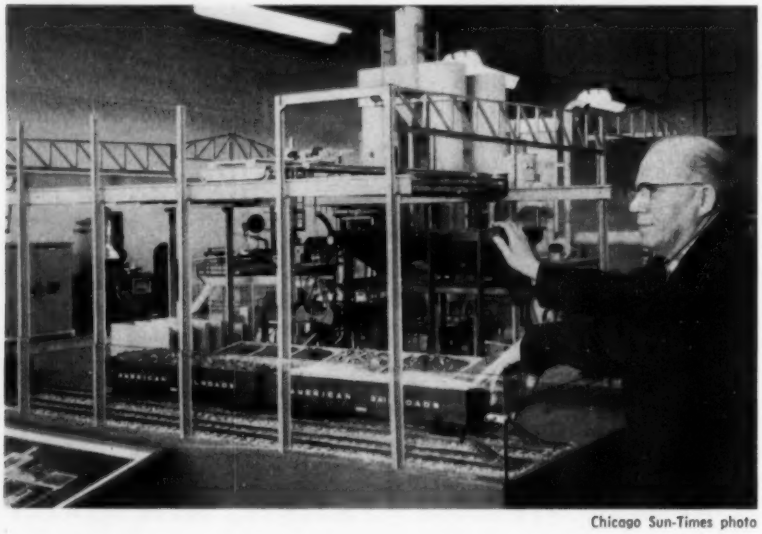
Gray iron jobbers are operating in excess of four days a week, but with restricted labor forces. Some trade estimates place production at 50 to 60 per cent of normal, with backlogs averaging around two weeks. Pipe shops are doing better, building up stocks for the spring season.

Business of steel foundries has shown no appreciable pickup so far this year. General machinery work remains light, as is also true of several lines of industrial equipment. Little ship work, such as valves, fittings, and deck machinery, is going to jobbers. Some steel foundries are operating five days a week but, with reduced working forces, they are averaging around 60 per cent of normal. Backlogs range three to four weeks.

Of the ferrous products, malleable castings are relatively the most active. Producers of pipe fittings and light hardware are operating at close to 80 per cent of capacity, it is claimed.

Independent brass and bronze shops are at a definitely better rate than a month ago, and some producers say buyers are beginning to build up inventories, something as yet not very noticeable in other lines of castings. Most jobbers continue to work with reduced personnel, but recently have added a day or more to their weekly schedules. Captive shops generally are at a good rate, and in the case of water meter manufacturers are beginning to farm out some work to jobbers.

Aluminum foundries report less aircraft and missile work, but state that miscellaneous requirements are stepping up, including various hardware items, hand tools, furnishings, etc.



Chicago Sun-Times photo

MODEL FOUNDRY IS GIFT: This animated scale model of a modern foundry has been presented to Chicago Undergraduate Div., University of Illinois, Navy Pier, Chicago, by Whiting Corp., Harvey, Ill. Valued at $35,000, it is 8 ft square and is built to a ½-in. scale. Looking it over is Roy W. Schroder, associate professor, foundry and pattern laboratory, Navy Pier.

Chicago—The animated scale model of an up-to-date foundry which has been displayed by Whiting Corp., Harvey, Ill., at recent American Foundrymen's Society shows, and has been viewed by literally thousands of visitors, is currently helping to train young potential foundry technicians at the Chicago Undergraduate Division, University of Illinois, Navy Pier, Chicago.

Gift of the model to the university by Whiting Corp. has been announced by Roy W. Schroeder, associate professor, foundry and pattern laboratory. Students in mechanical engineering and manufacturing processes classes will use the model in their studies.

Representing an investment of $35,000, the model is about 8 feet square, is built to a scale of ½-inch to the foot, and shows all major equipment used from raw material storage and charge make-up through melting and mold pouring.

Besides showing the latest equipment, the model also features scale workmen performing specific jobs to aid the observer in understanding various plant operations.

* * *

THE BIG government-owned aircraft engine plant in Chicago, operated since October, 1950, by Ford Motor Co., has ceased manufacturing and will be turned back to the government June 30. When Ford's Aircraft Engine Div. shipped its last Pratt & Whitney J-57 jet engine to the U. S. Air Force on Jan. 24, it completed its contracts.

The plant was built in World War II and operated by the Dodge Div. of Chrysler Corp. for manufacture of aircraft engines. After the war, it became the center of the late Preston Tucker's ill-fated at-

Lindberg-Designed

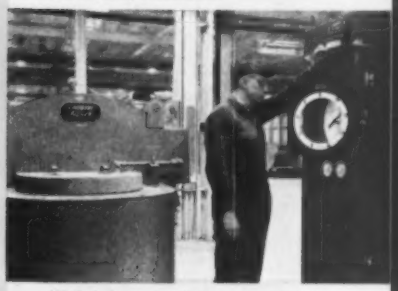
furnaces, more than 75 of them, help Ford Motor Company maintain casting production and quality standards

The new Aluminum Castings Plant of Ford Motor Company, Engine and Foundry Division, at Sheffield, Alabama, is a model of modern production efficiency. Contributing to its effective operation is a huge battery of Lindberg-Fisher aluminum holding furnaces, more than 75 of them. Eight large 65,000 lb. capacity reverberatory holding furnaces receive molten aluminum delivered from an adjacent Reynolds Metals plant and hold it at the desired temperature. Six other reverberatory furnaces, each with 20,000 lb. capacity, are used for remelting scrap aluminum from trimmed parts and holding metal at its usable temperatures. Molten metal is then delivered to more than 60 electric resistance holding furnaces in the casting area as needed. This unique installation, developed by Ford engineers in conjunction with Lindberg, is a major factor in maintaining the high quality product and production standards required by Ford.

Lindberg equipment and Lindberg planning can help you find the most effective answer to any problem of applying heat to industry. We cover the field, melting and holding, heat treating, tempering, brazing, enameling furnaces, ceramic kilns, high frequency units, and are in the ideal position to recommend just the type of equipment most suitable for your needs. This can be factory built or field-installed in your own plant, fuel-fired or electric. Consult your local Lindberg Field Representative (see the classified phone book) or get in touch with us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

SEE LINDBERG IN BOOTH NO. 660 at the WESTERN METAL CONGRESS

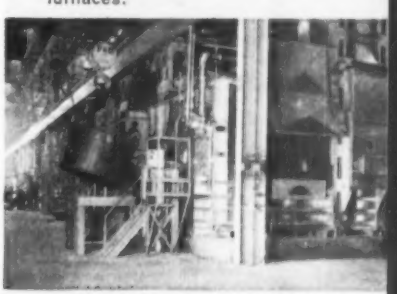
Handsome entrance to new plant of Ford Motor Company, Sheffield, Alabama.



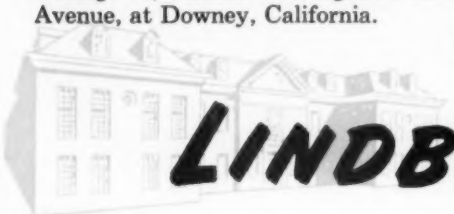
Metal temperatures are positively controlled through Lindberg Control Panel.

Some furnaces are arranged for hand ladling and others are equipped with Lindberg Autoladle.

Molten aluminum is delivered direct to reverberatory holding furnaces.



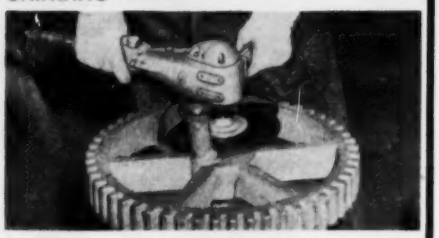
The molten metal is held in these 14 huge furnaces for distribution to the casting areas.



LINDBERG heat for industry

Circle 637 on Page 53

GRINDING



CUTOFF

SANDING

NEW... savings with Surface Grinders

$21.20 saved each day with Air Sander. Ask to see AIRengineering Report S-4300.65 No. 1.

Ingersoll-Rand

OFFERS YOU 32 SIZES OF SURFACE GRINDERS AND SANDERS

MODERN I-R Surface Grinders and Sanders—lightweight and versatile—are bringing down costs of surfacing operations in a wide variety of industries. These rugged air tools are easy to handle, easy to control. They provide less operator fatigue—more operator production.

Available in 32 sizes, and in speeds of 3000 to 6000 rpm—to assure you the right tool for maximum job efficiency. Call your local AIRengineer for complete facts.

Ingersoll-Rand the leader in Grinders offers a total of 121 different sizes!

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tempt to make a revolutionary new automobile. When that failed, the plant became a storage depot until Ford took it over to make the Pratt & Whitney R-4360 reciprocating engine for the Air Force.

Ford made more than 3500 R-4360s before it received an Air Force contract to make the J-57 jet engine in February, 1952. A cutback in production was ordered in October, 1957, and operations had been on a curtailed basis since then. The last engine shipped was the 6195th made under the contract.

At the peak in 1953, Ford employed 20,000 workers at the plant. Employment was 6820 on March 1, 1958, and this dropped to less than 1000 recently.

Facilities of the huge plant when Chrysler operated it during World War II included twin foundries, one for aluminum and the other for magnesium. When Ford took over operation of the plant in 1950, the emphasis in aircraft engines was on magnesium; consequently the aluminum foundry was converted to magnesium. After production shifted from reciprocating to jet engines, requirements for magnesium castings no longer justified keeping the foundry in operation. Consequently in midyear 1954 the foundry suspended and was mothballed and since has been maintained in that condition.

Pittsburgh— Foundrymen are more optimistic than they've been in months. New orders are coming in at a better rate, and all signs point to continued improvement. Steel foundries expect bigger releases from the mills at steelmaking operations approach prerecession levels. There's a marked improvement in demand for rolls and castings. Railroad orders are also on the upgrade.

"We're starting off a little better than we did in 1958," a sales executive comments. "Our backlog is up to normal, about 60 days, and we're running at 65 or 70 per cent of capacity. A year ago, we were at 50 per cent. We're working 40 hours a week, and we've been able to call a few people back. Prices seem to be firming up in the East, but there's still a lot of cutthroat competition in Ohio. Because of the drop in machine tool

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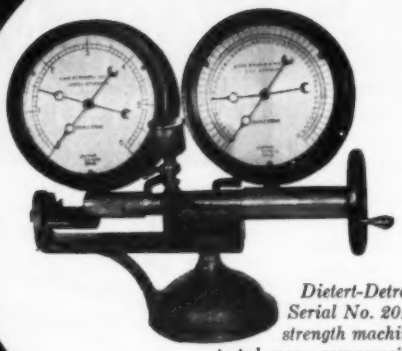
OLDEST KNOWN DIETERT-DETROIT SAND STRENGTH UNIT



Dietert-Detroit Serial No. 2048 strength machine tested green compression and shear strength only

RETIRED

after **30** years

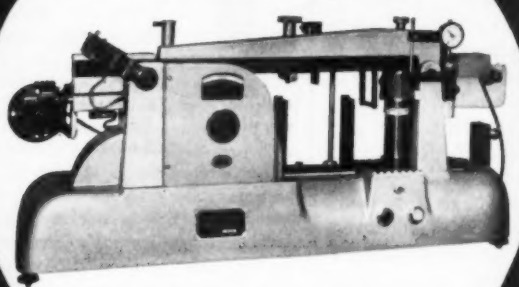
Harry W. Dietert Co. recently conducted a contest to find the oldest Dietert-Detroit Sand Strength Machine in daily use. 157 foundries reported on a total of 164 old-timers in the 20 to 30 year life range. The unit shown at left bears serial No. 2048. It was sold in 1928, was discovered at Clio Foundry, Clio, Michigan, in daily use, and going strong—attesting to the strength, durability and accuracy of foundry testing equipment bearing the Dietert name.

REPLACED

in **30** minutes

Harry W. Dietert Co. reserved the right to retire the 30-year unit, while Clio Foundry received as first prize a new Model 405 Dietert-Detroit Universal Sand Strength Machine. Operating instructions were transmitted in 30 minutes. *Write now for details.*

MODEL 405
DIETERT-DETROIT
Universal Sand Strength Machine



Greater capacity, sensitivity, and accuracy than any other instrument of its kind.

tests...

MOLDING SANDS
(a) Green Compression
(b) Dry Compression
(c) Green Shear
(d) Dry Shear
(e) Green Tensile
(f) Deformation
(g) Toughness

CORE SANDS
(a) Green Compression
(b) Baked Tensile
(c) Baked Transverse
(d) Baked Transverse Deflection

SHELLS
(a) Tensile Strength
(b) Transverse Strength

HARRY W. DIETERT CO.

9330 Roselawn, Detroit 4, Mich.

Gentlemen:

Send me facts on the No. 405 Dietert-Detroit Universal Sand Strength Machine.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

orders, Midwest foundries had to cut their prices to the bone just to stay in business."

Gray iron foundries also report better operations. Orders aren't coming in with regularity, but several firms have had the good fortune to land big ones. "We got a nice job from a New York refinery last week and some coke oven work from a local steel mill," says a foundryman. "As a result, we're pretty well set for February and early March."

A nonferrous foundry reports stronger demand for bronze castings used in steel mill pickling vats. It's running five days a week with bookings about 15 per cent ahead of last year's.

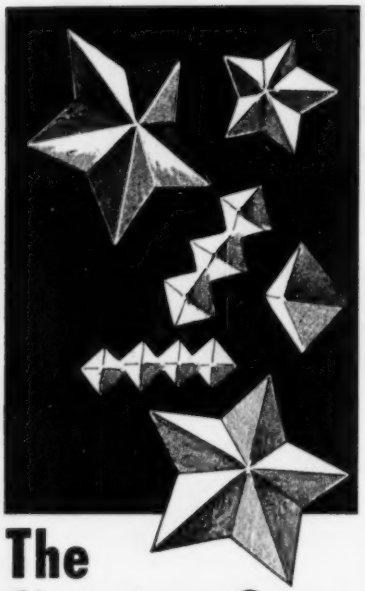
Boston— Although foundry operations are well below capacity, first quarter production of castings in New England will be the highest in more than a year. This situation applies primarily to gray iron, malleable, and nonferrous shops. The few shops pouring steel have reduced backlogs but maintain schedules close to the fourth-quarter level.

Most gray iron foundrymen regard the 1959 outlook as improved considerably over 1958 results. Users of castings are ordering on short delivery schedules with inventories low. Prices are highly competitive but still higher costs are expected. Scrap already has firmed while cost of labor and general supplies is expected to increase later. Most foundrymen doubt that pig iron will hold at $68 for No. 2 foundry for contract holders with Mystic Iron Co. through this year.

Capital expenditures for improved equipment will be larger, principally by jobbing shops; many of them need cost-saving tools to meet competitive conditions.

Additional foundries have gone to a five-day operating week, although there are some exceptions. Machine tool castings volume is light but has improved slightly. Melt by textile mill equipment shops is heavier; one of the largest units has gone on second shift. Most of these shops are mechanized and continue to take jobbing work.

Valve and fitting orders of the brass and bronze melters are slightly heavier among both captive and jobbing producers.



The Cleaning Stars

of ABMET, an abrasive resistant metal, last many times longer than chilled or hard iron. A trial order at these attractive prices will convince you.

ABMET STARS

SIX POINT STARS

1"	$300.	per	ton
1¼"	280.	"	"
1½"	260.	"	"
2"	220.	"	"
2½"	220.	"	"
3"	220.	"	"

FIVE POINT STARS

1¼"	$280.	per	ton
2"	220.	"	"
2½"	220.	"	"
3"	220.	"	"

F.O.B. QUINCY, OHIO

AGRICULTURAL ABMET BEARING METAL

QUINCY FOUNDRY INC.

QUINCY, OHIO

Circle 640 on Page 53

QUICK— ACCURATE Temperature Readings in Non-ferrous Molten Metals with

XACTEMP

Trade Mark Reg U.S. Pat. Off.

HAND PYROMETERS

Accurate to Within a Fraction of a Scale Division

The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

Cast aluminum and brass construction. Indicator is of medium resistance not affected by thermocouple length . . . acts rapidly . . . provided with Alnico V magnet and direct reading dial starting at 50° F. 43" stainless steel extension . . . standard 7" Marshall tip permits true readings below surface of metal. Made to give good service for years. Order at once to be sure of immediate delivery from stock.

Catalog No. MM701 $68.50
Complete with Thermocouple..

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Ask about XACTEMP PYROMETERS for all-around general temperature checking. A full line of thermocouples available in stock.

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2027 Hamilton Avenue, Cleveland 14, Ohio

Circle 641 on Page 53

FEF-Wheelabrator Fellowship Winners for 1959 Announced

The Board of Awards of the Foundry Educational Foundation has announced the selection of five FEF-Wheelabrator Fellowship winners for 1959.

Wheelabrator Fellowships, valued at $1500 each, are awarded on the basis of outstanding academic achievement, interest in the cast metals industry, outstanding characteristics of leadership and personality, and positive indications of professional potential.

Winners are the following:

Charles A. Rowe, Coraopolis, Pa. Mr. Rowe, 22, will be graduated from Massachusetts Institute of Technology in June, 1959, with a degree in metallurgical engineering, and he plans to continue his study for a master's degree in metallurgy at MIT. He has held an FEF scholarship since 1957.

James H. Steele, Jr., Blacksburg, Va. Mr. Steele, 21, will be graduated from Virginia Polytechnic Institute in June, 1959, with a degree in metallurgical engineering and will continue on that campus for a master's degree. He is an FEF scholarship holder.

Robert G. Liptai, St. Louis. Mr. Liptai, 21, will be graduated from Missouri School of Mines with a degree in mechanical engineering and will continue his studies on that campus for an advanced degree. He also is an FEF scholarship holder.

Ernest J. Poirier, Medford, Mass. Mr. Poirier, 28, is a Marine Corps veteran. He will be graduated from Northeastern University in June, 1959, with a degree in chemical engineering. Under the Wheelabrator Fellowship, he will study metallurgical engineering at the graduate level at MIT. In addition to his regular studies at Northeastern, Mr. Poirier voluntarily took foundry engineering courses at MIT.

Thomas S. Piwonka, Cleveland. Mr. Piwonka, 21, plans to continue his study in metallurgy for a master's degree after he has been graduated from Case Institute of Technology in June, 1959. He is an FEF scholarship holder.

The first eight Wheelabrator awards were granted in 1958.

Circle 642 on Page 53

AMASTEEL

TTRACTIVE FINISH

EETS S.A.E. SPECIFICATIONS

RC ELECTRIC FURNACE QUALITY

OLVES CLEANING AND PEENING PROBLEMS

ESTED AND PROVEN OVER 23 YEARS

NGINEERING SPECIALIST AVAILABLE

ASY ON BLASTING EQUIPMENT

IFE FACTOR OVER 2,500 PASSES

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Circle 643 on Page 53

IHEA Forms New Division of Industrial Oven Manufacturers

The Industrial Heating Equipment Association has formed a new Industrial Oven Division. Representatives of leading oven manufacturing firms attended the 30th annual winter meeting of the association, Jan. 19-20 in Cleveland and at that time determined to affiliate their firms in the new IHEA group.

The association now is composed of four groups—Furnace Division, Induction and Dielectric Division, Combustion Division, and the newly created Oven Division. The new Oven Division has 12 manufacturing firms of which nine are new IHEA members. Preliminary estimates indicate that the IHEA oven group produces in excess of 60 per cent of the nation's industrial ovens.

Members of the Oven Division elected Robert Baker, R. C. Mahon Co., as its chairman and Chester J. Schmidt, J. O. Ross Engineering Co., secretary.

Oven division members include Cincinnati Cleaning & Finishing Co., Cincinnati; Electric Hotpack Co., Philadelphia; Foundry Equipment Co., Cleveland; Geo. Koch & Sons Inc., Evansville, Ind.; Lanly Co., Cleveland; R. C. Mahon Co., Detroit; Michigan Oven Co., Detroit; J. O. Ross Engineering Div., New York; Spra-Con Co., Chicago. Also in the group are three firms which already were IHEA members: Lindberg Engineering Co., Chicago; W. S. Rockwell Co., Fairfield, Conn., and Trent Inc., Philadelphia.

R. L. Harper, executive vice president, Harper Electric Furnace Corp., Buffalo, was elected president of the Industrial Heating Equipment Association at its annual meeting.

W. E. Benninghoff, vice president and Tocco Div. general manager, the Ohio Crankshaft Co., Cleveland, was named vice president of the association. Roy R. Snyder, treasurer, W. S. Rockwell Company, Fairfield, Conn., was elected treasurer; R. B. Hanna, general manager, General Electric Co., Shelbyville, Indiana, was elevated to the executive committee, and Robert E. Fleming was re-elected executive vice president.

New members of the board of directors include W. E. Benninghoff; R. M. Buck, president, Bryant Industrial Products Corp., Cleveland; and Hugh J. Pugsley, vice president, Swindell-Dressler Corp., Pittsburgh.

Approximately 85 top executives of the industrial heating equipment industry attended the two-day session held at the Hotel Cleveland.

Col. W. R. Carter, Aeronautical Systems Center, Wright-Patterson Air Force Base, spoke to the group at its annual banquet on "New Weapons Systems and their Industrial Requirements"; H. B. Schmidhauser, American Management Association, addressed the members on "Motivating Your Personnel" and "Communications Within the Corporation," and Dr. E. C. Nevis, president, Personnel Research & Development Corp., spoke on "Psychological Testing of Management and Sales Personnel." J. A. Lambert, Factory Insurance Association, addressed a joint Combustion-Furnace Division session on "Combustion Safeguards."

STOP
WASTING
GRINDING WHEELS
AND
INCREASE PRODUCTION
with the famous
STANDARD
infinitely
variable speed
SNAGGING
GRINDER

35 A

TURN HAND WHEEL—automatically adjusts guard, increases spindle speed in relation to worn wheel—you get FULL WHEEL WEAR DOWN TO FLANGES! Foundries report as much as 100% increase in wheel life.

INFINITELY VARIABLE SPEED means proper peripheral speed at all stages of wheel wear—AS MUCH AS 60% INCREASED PRODUCTION FROM CONSTANTLY CORRECT WHEEL SPEED AT POINT OF GRINDING!

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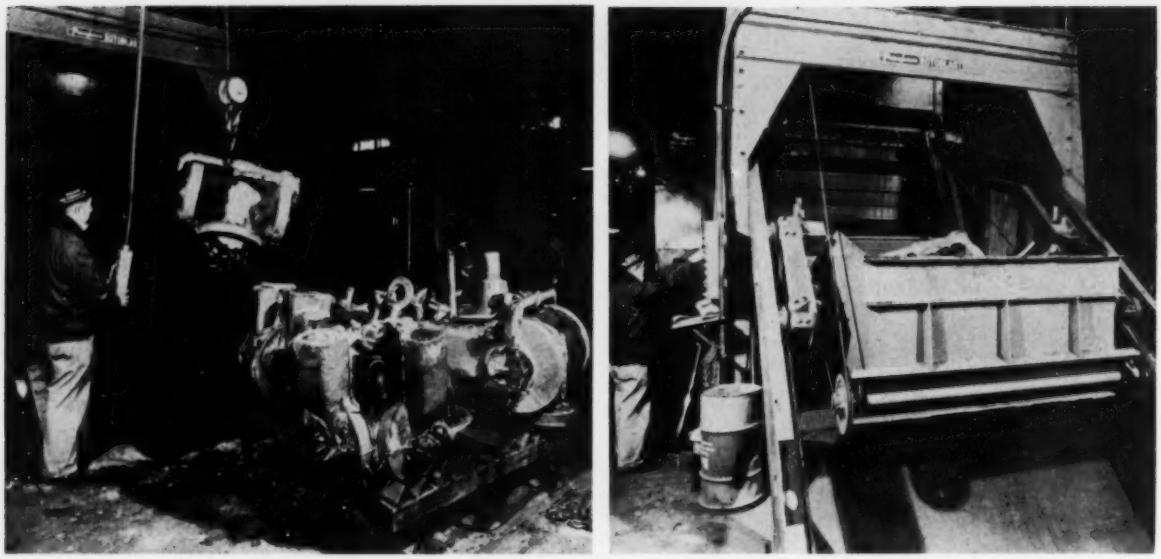
FOUNDRY GRINDER DIVISION
2507 RIVER ROAD • CINCINNATI 4, • OHIO

STANDARD
TRADEMARK OF METALWORKING THROUGHOUT THE WORLD



Steel valve castings are transferred from pallets into loading skip by overhead crane. Tote boxes of lighter castings are dumped directly into skip

Cleaning Time Halved by

HUGE BLAST BARREL

● A CLEANING BARREL with 72-cu-ft capacity is reported to have enabled Fort Pitt Steel Casting Div., Pittsburgh Steel Foundry Corp., McKeesport, Pa., to reduce cleaning time by one half. One of the largest blast barrels in the world, it is in full-time operation cleaning loads averaging more than 5000 lb each.

With a production rate of about 600 tons of steel castings per month, Fort Pitt formerly used two airblast rooms for larger castings and two 20-cu-ft blast barrels for smaller work. The 72-ft barrel has taken over almost all blast cleaning requirements and has enabled the company to retire one airblast room and one of the small barrels. The second airblast room is retained for touchup on the largest castings produced by the company. The second 20-ft barrel has been retained as an emergency standby, but has not been used since installation of the 72-ft unit.

Cleaning Time Cut 60 Per Cent—A single casting formerly required 5 minutes for a simple spot blast, but four now are cleaned simultaneously in 8 minutes. This time saving alone has enabled the company to release five men on its cleaning crew for other plant operations.

Castings previously were cleaned in the green stage only by spot blast at points where gates and risers were to be cut off subsequently. Most now are cleaned three times: 1. In the green stage prior to burning off gates and risers. 2. After heat treatment. 3. After welding and drawing. With sand cores removed, the time required for subsequent operations has been reduced, and better annealing is accomplished.

In addition to cutting blasting time, Fort Pitt makes additional savings through improved material handling techniques. Large castings can be handled by a fork truck and tote box, whereas use of an airblast room required individual handling for loading, turning, and unloading.

Castings are loaded into the machine by a pushbutton-controlled work loader. All operations, including loading, starting, stopping, and unloading, are handled automatically from a control panel.

Work Conveyor—The big barrel is equipped with a heavy-duty work conveyor to handle large castings. Individual slats of the conveyor are rolled steel with welded, normalized stiffening members which form an H-section for maximum strength. These 1½-in. slats permit use of two supporting chains instead of the usual four. Inaccessible chains have been climinated to reduce maintenance.

When the barrel is operating, the work-carrying conveyor travels upward to tumble castings under abrasive thrown by two blast wheels, each powered by a 40-hp motor. Together, they can throw 120,000 lb of abrasive per hour. After the cleaning operation, direction of the conveyor is reversed, and the load automatically is discharged into a tote box. An abrasive cleaning and reclaiming system built into the machine removes fines, sand, and debris.

Fort Pitt's plant housekeeping also has been improved by the integration of a dust collecting unit to assure a clean working atmosphere.

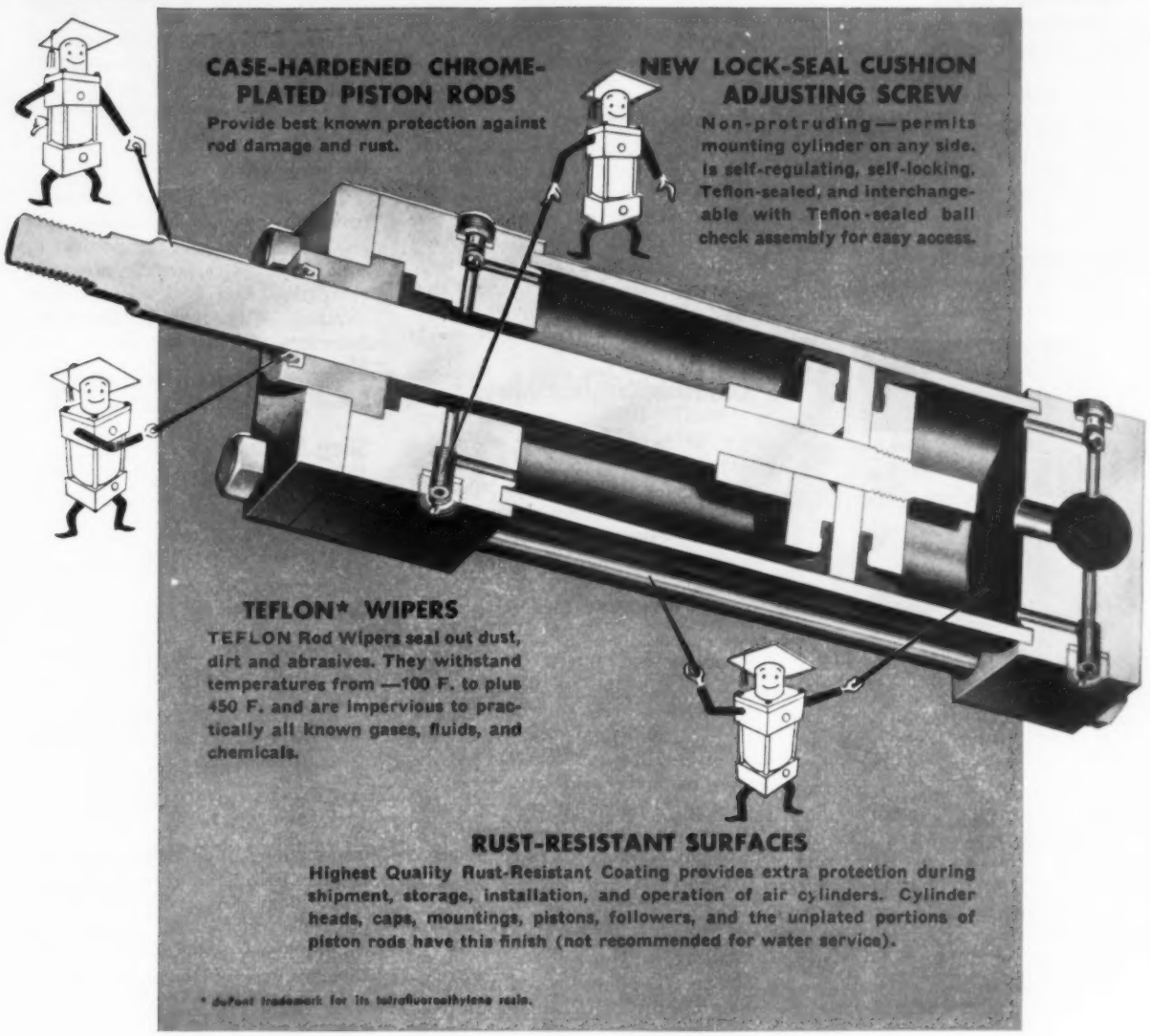
The 72-cu-ft barrel, the abrasive system, and the dust collector are made by Pangborn Corp., Hagerstown, Md.

At No Extra Cost . . .

Miller®

AIR CYLINDERS

with EXTRA QUALITY Features!



CASE-HARDENED CHROME-PLATED PISTON RODS

Provide best known protection against rod damage and rust.

NEW LOCK-SEAL CUSHION ADJUSTING SCREW

Non-protruding — permits mounting cylinder on any side. Is self-regulating, self-locking, Teflon-sealed, and interchangeable with Teflon-sealed ball check assembly for easy access.

TEFLON* WIPERS

TEFLON Rod Wipers seal out dust, dirt and abrasives. They withstand temperatures from —100 F. to plus 450 F. and are impervious to practically all known gases, fluids, and chemicals.

RUST-RESISTANT SURFACES

Highest Quality Rust-Resistant Coating provides extra protection during shipment, storage, installation, and operation of air cylinders. Cylinder heads, caps, mountings, pistons, followers, and the unplated portions of piston rods have this finish (not recommended for water service).

* duPont trademark for its tetrafluoroethylene resin.

Other Standard Miller Quality Features include: bar stock steel heads, caps, and mountings; rust-resistant brass barrels; self-regulating, wear-compensating piston rod seals that never require adjustment; space-saving square design; and other features as shown in Bulletin A-105 sent free on request.

Sales and Service from Coast to Coast . . .

Miller Air Cylinders are available in 1½" through 20" bores for 250 psi operation. Select from 19 standard mountings, strokes up to 22 feet, single and double rod end, cushioned and non-cushioned, and over-size rod cylinders. Large selection for immediate delivery.

MILLER FLUID POWER
DIVISION OF THE MILLER ELECTRIC MANUFACTURING CO.

2034 N. Hawthorne Ave., Melrose Park, Illinois

Circle 645 on Page 53

Literature for Foundrymen

Tumble Mill Liners

Information sheets cover tumble mill liners to reduce noise, casting breakage, and damage. A chart shows noise reduction in an actual operation.—**A.I.C. Engineering Co.**, Box 55421, Uptown Station, Indianapolis, Ind.

For More Details Circle No. 468—Page 53

Equipment Records

Form 33215, "Monthly Time & Cost Record Book," has 12 sets of

pages on which to record, day by day, each month's operating expenses for one of the company's machines. (In addition to the other pages, an annual summary sheet is included for entering monthly totals to obtain annual cost figures. Pocket-size Form 32818-G, "Daily Time & Cost Record Booklet," also is available for recording expenses as they occur in the field.—**Caterpillar Tractor Co.**, Peoria, Ill.

For More Details Circle No. 469—Page 53

Shell Molding Machines

Bulletin 148/NA describes a semiautomatic shell molding machine for short-run production with pattern plate up to 20 x 15 in. maximum. Available as a single or double station machine. A fully automatic machine, single or double station, with production of 40-45 shells per hour each station in maximum shell size of 24 x 18 in., is detailed in Bulletin 149/NA.—**F. E. (North America) Ltd.**, 47 Advance Rd., Toronto 18, Ont., Canada.

For More Details Circle No. 470—Page 53

Portable Elevators

Industry-sponsored basic reference guide tells what portable elevators are and illustrates their advantages and applications for vertical handling of material.—**Association of Lift Truck & Portable Elevator Manufacturers**, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 471—Page 53

Corrosion-Resistant Alloys

Booklet F-30,131 presents extensive data, much of it in chart and graph form, on resistance to corrosion of company alloys subjected to over 250 different corrosive materials.—**Haynes Stellite Co.**, a division of **Union Carbide Corp.**, Kokomo, Ind.

For More Details Circle No. 472—Page 53

Foundry Equipment

Catalog 930 covers electric vibrating feeders and conveyors, coolers, dryers, magnetic separators, and bin level indicators. Controls, installation methods, principles of operation and individual unit specifications are included.—**Jeffrey Mfg. Co.**, 907 N. Fourth St., Columbus 16, Ohio.

For More Details Circle No. 473—Page 53

Dust Collectors

Cabinet, cloth filter dust collectors in the 500 cfm ranges are illustrated and described in information sheets which contain multiple rating tables and complete specifications.—**Torit Mfg. Co.**, Dept. KP, Walnut & Exchange Streets, St. Paul, Minn.

For More Details Circle No. 474—Page 53

Foundry Metals

"Vancoram Products" lists ferroalloys for additions of chromium, silicon, manganese, vanadium, columbium, boron, titanium, and other metals for use by iron and steel foundries and steel mills. Typical compositions are detailed.—**Vanadium Corp. of America**, 420 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 475—Page 53

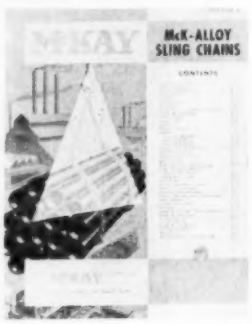
Welding Wire

Bulletin DH-1218-O compares competitive makes of welding wire and gives physical properties as welded, analyses, tensile strength, elongation, and Rockwell hardness numbers.—**Page Steel & Wire Div., American Chain & Cable Co.**, Monessen, Pa.

For More Details Circle No. 476—Page 53

Sling Chains

Revised catalog, Bulletin A, provides specifications and additional



information on sling chains and attachments in sizes from ¼ through 2 in. diam. A section covers the use, care, safety, and inspection of sling chains.—**McKay Co.**, 1005 Liberty Ave., Pittsburgh 22, Pa.

For More Details Circle No. 477—Page 53

Wire Rope Inspection

Bulletin 104 outlines a program of inspection for increasing the service life of wire rope.—**Leschen Wire Rope Div., H. K. Porter Co.**, 2727 Hamilton, St. Louis 12, Mo.

For More Details Circle No. 478—Page 53

Shell Sand Lubricants

"Technical Data Report on Shell Sand Coating" describes lubricants which prevent lumping during the

Circle 645 on Page 53

No. 8® GRAPHITIZER

TREATS GREY IRON EFFECTIVELY FOR LESS THAN 10¢ PER TON!

Thousands of foundries are already employing No. 8 because it is such an amazingly simple and accurate graphitizer. No. 8 is a powerful inoculant. It plants graphite *throughout* the molten metal. No. 8 gives castings a higher machinability rating. It reduces chill and hardness in thin sections and improves wear and shock resistance. No. 8 makes castings more metallurgically uniform and, most important of all, No. 8 graphitizer *substantially reduces the cost of metal control* (cost figures in several foundries are below 10¢ per ton of metal treated). No. 8 is easy to apply by funnel or envelope method. As the photomicrographs shown here indicate, No. 8 is effective for special metallurgical control. From every standpoint it will pay you to use No. 8, regularly. For further details write for Engineering Bulletin No. 2.

Base Iron

Photomicrograph from broken half of 1.25 arbitration bar of gray iron not treated with No. 8 Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties: Transverse Strength 2,497 lbs. (wedge bar) • Brinell Hardness 229 (wedge bar) • Total Chill Depth 41/32 in., Clear Chill 26/32 in. • Deflection 0.23 in.

Treated Iron

Photomicrograph from broken half of arbitration bar of same base iron treated with 1 lb. per ton of No. 8. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties: Transverse Strength 2,970 lbs. (wedge bar) • Brinell Hardness 217 (wedge bar) • Total Chill Depth 13/32 in., Clear Chill 10/32 in. • Deflection 0.31 in.

Note how the iron treated with No. 8 has increased in deflection. Usually iron treated with No. 8 will show an increase from 10% to 30% in deflection over the base iron value—this means less cracked castings and more serviceable metal.

GF240-1

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

10 hours' work in an 8-hour shift!

WHEELABRATOR® STEEL SHOT SLASHES ABRASIVE COSTS 35%

AT EVINRUDE MOTORS

This impressive reduction in blast cleaning abrasive costs was accomplished by switching from a malleable type abrasive to Wheelabrator Steel Shot.

According to Mr. Joe Vinette, Foundry Superintendent, "Wheelabrator's Abrasive Engineer was very helpful in setting up a program of inspection, preventive maintenance, and proper operation of blast equipment. A simple record keeping system was established which resulted in better cost control information. Following his recommendations and switching to Wheelabrator Steel Shot, we have been able to cut our abrasive cost by $0.96 per wheel hour!"

Your Wheelabrator Abrasive Engineer will help you achieve similar savings. Write for details of this exclusive service.

Send for complete information on how Wheelabrator Steel Shot can solve your cleaning problems.

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mixing and mulling cycle in either the hot or cold coating processes and prevent caking of coated sand during storage. — **Nopco Chemical Co., Metals Div.,** 60 Park Place, Newark, N. J.

For More Details Circle No. 479—Page 53

Wear Plates

Trunnion-head wear plates with replaceable inserts for use in tumble type shot cleaning equipment are described in information sheet.— **A.I.C. Engineering Co.,** Box 55421, Uptown Station, Indianapolis, Ind.

For More Details Circle No. 480—Page 53

Office Copying Techniques

How office copying can save money and increase efficiency in purchasing, sales, production, administration, advertising, research, accounting, shipping, receiving, and engineering is described in Booklet F1-106.—**Business Photo Methods Div., Eastman Kodak Co.,** Rochester 4, N. Y.

For More Details Circle No. 481—Page 53

Temperature Control

Data Sheet ND46-33(6) gives information on the company's multiple-point recorder controller assembly for two-position temperature control on processes, such as annealing, involving multizone control.—**Leeds & Northrup Co.,** 4934 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 482—Page 53

Self-dumping Hoppers

Applications of self-dumping hoppers when used with lift trucks are described in Bulletin 260. Specifications for various model hoppers are included.—**Roura Iron Works Inc.,** 1401 Woodland Ave., Detroit 11, Mich.

For More Details Circle No. 483—Page 53

Positive Pressure Blowers

Rotary positive pressure blowers and gas pumps are pictured in Bulletin S-59G. Blower operation, construction, types of drive, timing gears, and thrust bearing assemblies are discussed. — **Sutorbilt Corp.,** Compton, Calif.

For More Details Circle No. 484—Page 53

Vibration Control

Shock dampening and vibration isolation material for use as mounting pads and components for heavy, high-impact machinery is available

10 hours' work in an 8-hour shift!

That's the production advantage of the Yale Industrial Tractor Shovel

Here are the features that make the Yale Industrial Tractor Shovel outstanding...

PRECISELY CONTROLLED HORSEPOWER! 72 hp. 6 cylinder engine provides smooth power through matched torque converter and Yale torque transmission (fully automatic). One speed in both directions. Inching control permits delicate close-quarter maneuvering. Extra punch for impact loading. Accelerates to 13 mph. in 5½ seconds.

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SAFETY! Safety-curve lifting mechanism members never rise alongside the operator. Front and back working lights provide extra security.

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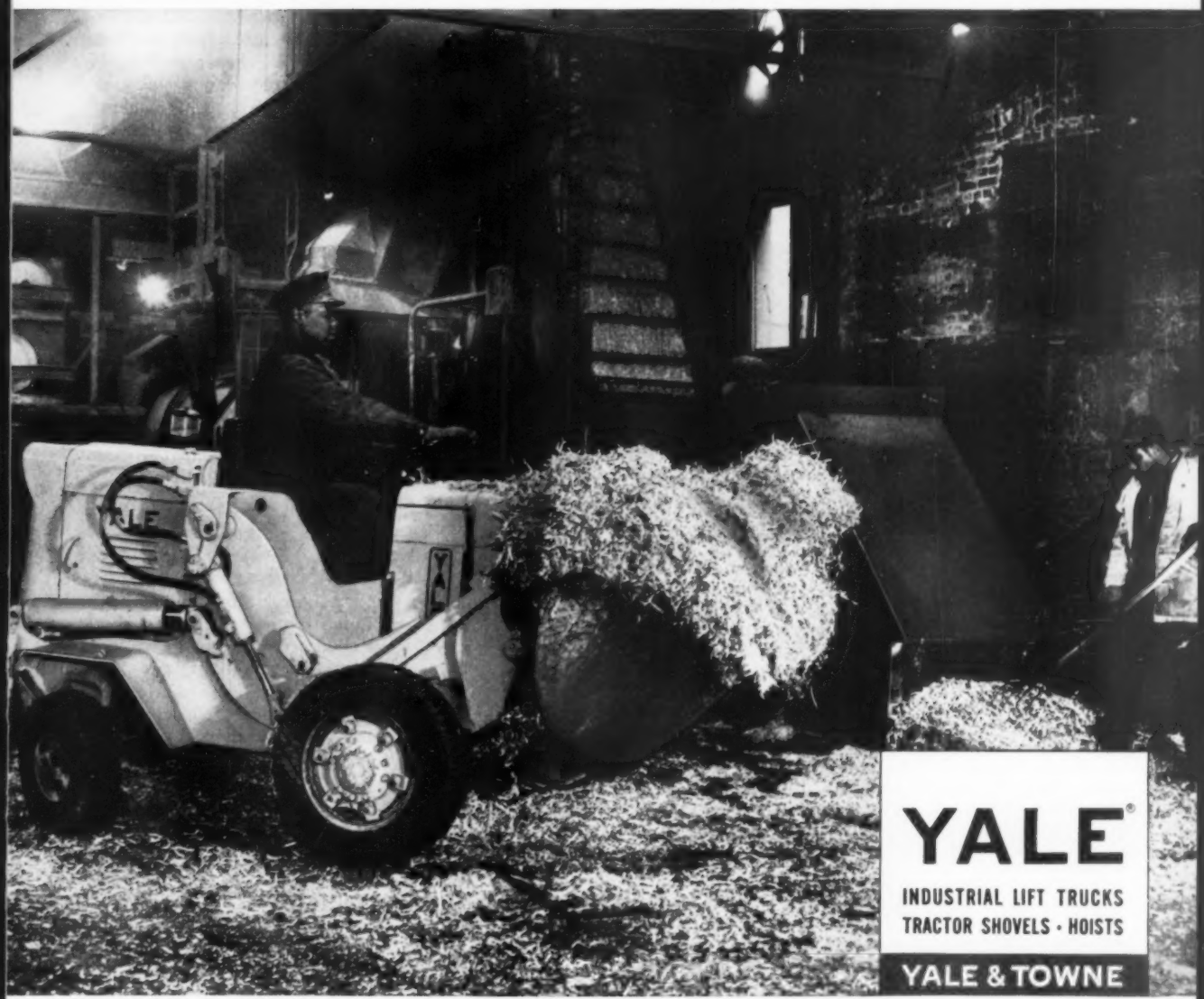
Field applications prove that these features add up to 25% more work per hour—10 hours' work in an 8-hour shift. For a demonstration in your plant or complete information contact your Yale representative. Or write The Yale & Towne Manufacturing Company, Yale Materials Handling Division, Dept. YT-2-V.



Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark.
Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists

Circle 647 on Page 53

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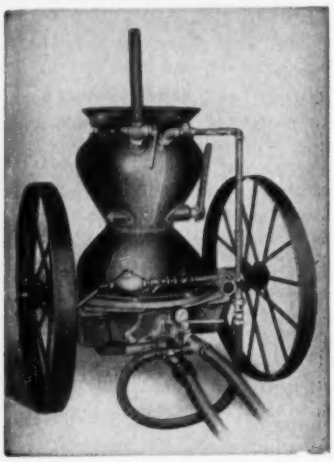

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Circle 648 on Page 53

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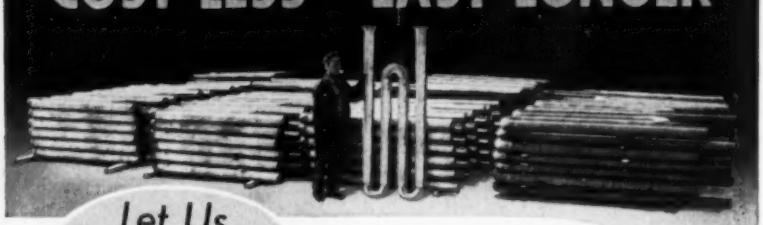

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Circle 649 on Page 53

in preformed pads, slab stock, and special shapes. Bulletin describes the material and illustrates its use. —**Preformed Pad Div., Voss Belting & Specialty Co.**, 5645 N. Ravenswood Ave., Chicago 26, Ill.

For More Details Circle No. 485—Page 53

Air Filters

High efficiency mechanical filters are described in Bulletin 238. Illustrations of media and full assemblies, filter selection tables, charts of engineering data, and performance curves are included.—**American Air Filter Co.**, 215 Central Ave., Louisville, Ky.

For More Details Circle No. 486—Page 53

Sling Chains

Detailed specifications covering Herc-Alloy sling chains, plus instructions on care, use and inspection of chains, are given in Data Book No. 100B. Separate Bulletin 110 describes the Hammerlok coupling link which permits making up chain assemblies without peening or welding.—**Columbus McKinnon Chain Corp.**, Tonawanda, N. Y.

For More Details Circle No. 487—Page 53

Pressure Regulators

Form ADC 705F contains flow and pressure specifications and inlet and outlet connection dimensions for cylinder, manifold, and station pressure regulators. Adapters, station valves, flowmeters, hose connections, and pressure gages also are described.—**Air Reduction Sales Co.**, a division of **Air Reduction Co.**, 150 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 488—Page 53

Coated Abrasives

Information kit includes a buyer's guide for coated abrasives, selector charts for metalworking and woodworking operations, and brochures on coated abrasives for the metalworking and woodworking trades.—**Carborundum Co.**, Niagara Falls, N. Y.

For More Details Circle No. 489—Page 53

Fluid Power Cylinders

Three data sheets are available: One covers acceleration and deceleration forces of power cylinder operation; the second lists accessories available for clevis mounting of air and hydraulic cylinders, and the

third appraises and compares types of hydraulic cylinder tubing end seals. — **Miller Fluid Power Div., Flick-Reedy Corp.**, 2040 N. Hawthorne Ave., Melrose Park, Ill.

For More Details Circle No. 490—Page 53

Sand Reclamation

Bulletin 2000 explains the operation and advantages of the company's sand reclamation unit and describes integrated and package systems.—**Beardsley & Piper Div., Pettibone Mulliken Corp.**, 2424 N. Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 491—Page 53

Grate Cooler

Bulletin CO-6 describes and illustrates a horizontal-grate cooler designed to cool materials discharged from rotary kilns, sintering machines, roasters, and various types of furnaces. — **Fuller Co.**, Fuller Bldg., Catasauqua, Pa.

For More Details Circle No. 492—Page 53

Air Compressors

Three models of air compressors with pressure capacities from 80 to 250 psi are described in Bulletin SG-2. Specifications list cfm displacements, pressures, weights, dimensions, and rpm of various models and sizes.—Sales Promotion Dept., **Le Roi Div., Westinghouse Air Brake Co.**, Milwaukee 1, Wis.

For More Details Circle No. 493—Page 53

Cranes and Hoists

Complete data on motor-operated and hand-operated hoists, jib cranes, hand-traveling cranes, and motor-driven cranes is given in Bulletin DH-28.—**Wright Hoist Div., American Chain & Cable Co.**, York, Pa.

For More Details Circle No. 494—Page 53

Pneumatic Conveyor

Specification Sheet 205 covers a portable pneumatic conveyor for free-flowing granular materials.—**Sprout, Waldron & Co.**, 130 Logan St., Muncy, Pa.

For More Details Circle No. 495—Page 53

Vibrating Conveyors

Bulletin 353 describes how natural-frequency vibrating conveyors operate and gives capacity and installation data on the company's conveyors. — **Stephens - Adamson Mfg. Co.**, Aurora, Ill.

For More Details Circle No. 496—Page 53

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Why continue to test abrasives when we already have done the testing for you? Hundreds of satisfied customers have learned by actual experience that there is no better shot and grit than "Controlled T", Permabrasive, Perma-Steel and Perma-Grit. One of these will meet your special needs and at the same time cut your costs.
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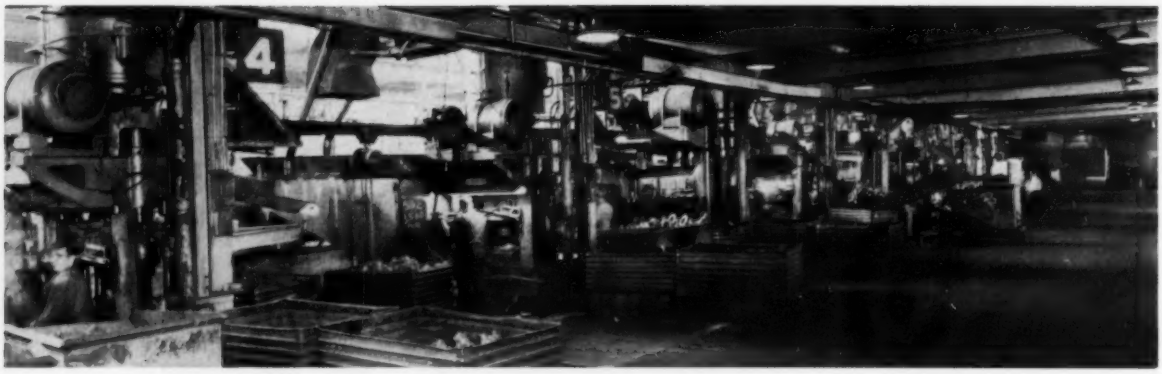

Fig. 1—Some of the 300 and 500-ton capacity hydraulic presses used chiefly to straighten malleable and pearlitic malleable castings at a midwestern foundry

Hydraulic Presses Speed

Straightening of Malleable Castings

• SEVENTEEN hydraulic presses of 300-ton and 500-ton capacity are used by a large midwestern foundry in straightening malleable iron and pearlitic malleable iron castings ranging from less than a pound to over 90 pounds in weight. Some of the presses also perform piercing and shearing operations either in combination with or independent of straightening.

Certain variables in casting and heat treating, including annealing and tempering, result in some warpage but, because the castings are malleable, this distortion is readily removed by the application of presses equipped with straightening dies.

Fig. 1 shows a portion of the hydraulic presses of fast traverse type used for straightening. All are of the same make and general design. Some presses are double acting, the initial action being used to clamp the casting in proper location, especially when piercing, shearing, or trimming is done in addition to straightening.

Generally, stationary hoppers are situated at each press. The press operator picks up the castings, one or two at a time, places them in the press die, and trips the press by placing both hands on control buttons. He then removes the straightened castings from the die, which has opened, of course, on the return stroke of the press. As a rule, the casting removed is placed on chute-like benches, and is examined visually by an inspector before being placed into a tote box for transfer to the shipping department.

Safety is assured by placing dual trip buttons well apart and away from the die, making it necessary for the operator to keep both hands in safe position. In addition, a sweep bar swings across the front of the die as the press is closing. This bar will push hands of anyone aside if they chance to be close to the die when the press closes.

An important consideration that led to the use of hydraulic presses for most straightening and some piercing and trimming is that oc-

Fig. 2—Closeup of one of 17 fast hydraulic presses used to straighten castings. Capacities of the presses vary, and a few are double-acting

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Standard's silica is mined from an area wonderfully rich in tremendous deposits of St. Peter's sandstone. Painstaking washing and grading processes produce foundry sands second to none in the world.

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Circle 651 on Page 53

Fig. 3—To trip press when straightening casting, operator must keep both hands on start button. A sweep bar in front of die aids safety

casionally castings may be oversize sufficiently to overload and even cause press or die breakage, or both, if the stroke were positive. With the hydraulic press, the maximum pressure applied can be set readily, and this pressure cannot be exceeded regardless of the size of the casting. Accordingly, the ram will stop when the set pressure is reached, and if the casting chances to be oversize, no harm to the press results.

Much of the straightening done in the hydraulic presses is on flanges that have become warped. Pressure applied correctly by the straightening die readily makes the flange flat or causes it to conform to some other shape (say a specified curve), but if the flange happens to be above specified thickness, the metal-to-metal contacts could overload a positive press excessively. With the hydraulic press, however, the maximum pressure set cannot be exceeded and breakage of the press cannot result. There is, too, somewhat of a cushioning action that tends to prevent die breakage.

Castings produced in this foundry vary greatly in shape as well as in size and this, of course, involves difference in straightening pressures needed and in practices used. Among the larger castings are some shown in Fig. 4. They include differential carriers, used in rear axle assemblies (some of which are for truck applications) and steering gear housings. Such parts require large dies for straightening, and this work is generally done in the larger hydraulic presses.

Many smaller castings, of which a typical group appears in Fig. 5, also are produced. They include crankshafts for small engines, yokes for universal joints, and transmission and anchor plates having five openings as shown at extreme right. The central hole in the anchor plates is cored but those at the four corners are pierced in a press operation. At the same time, any fins left in the cored holes are sheared out, thus leaving a clean hole periphery. In the crankshafts, a tie bar between cheeks or throws is cast opposite the crankpin (as an aid to reducing warpage) and is machined out later.

Although most large holes are cored in the malleable iron castings shown here, small holes such as those near the corners of the anchor plates shown are not usually cored. Since the casting is made malleable by heat treatment, however, piercing is feasible and has the advantage that size and location are held closely and more expensive drilling is not needed. Such considerations add considerably to the utility of the hydraulic presses in a malleable iron foundry and also aid in lowering total cost of some castings by avoiding certain machine operations.

Fig. 4—These castings are typical of the large ones produced. They include steering gear housings and differential carriers used on axles

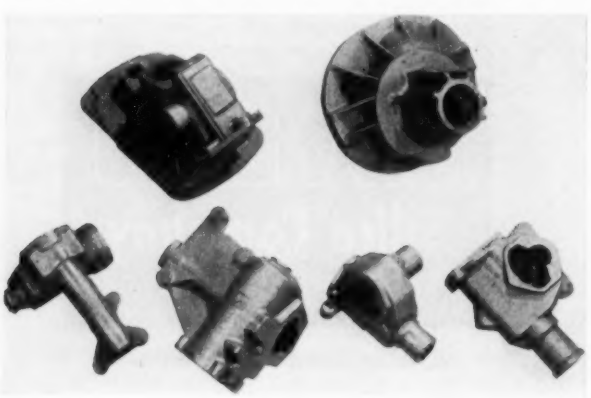

Fig. 5—Typical small castings. One punch removes fins from the central openings of anchor plates, right. Four others pierce the holes near corners

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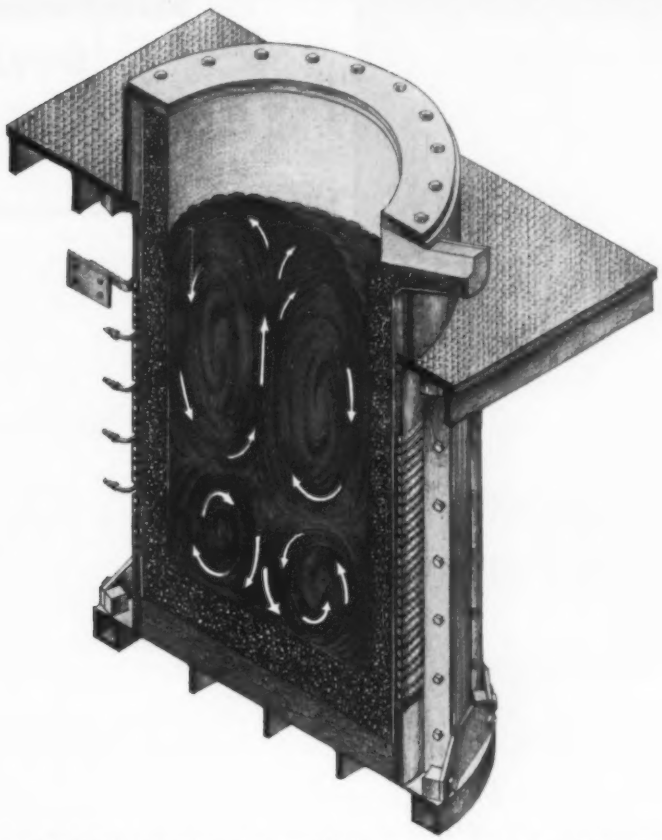

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Circle 653 on Page 53

The Sandman Says

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Some Remarks on Shell Molding"

● IN ANY study of foundry sand practice, the student should be grounded in the fundamental concepts. These are relatively simple, and an understanding of them should precede any consideration of the more profound and complex phases of the subject.

Our man at the muller is not ready for a college textbook. Instead, he should be provided with a simple and general explanation of all matters directly concerned with his daily performance, and it might be advisable to have him catechized occasionally. I sometimes feel that educators understand their subjects much better than they do their students. As a result, students frequently become lost in complex problems before they understand the fundamental approach.

The old-time foundryman depended entirely on trial and error to determine his *modus operandi.* In spite of scientific progress, that method hasn't been superseded completely in even our most modern foundries. After all, academic theories have little value for most of us until proved in practice; and in the light of practice, such theories frequently are subject to considerable revision before they receive even partial acceptance.

Review—It certainly would be interesting, and I believe instructive, if some authority would compile an outline or history of the theories concerning foundry sand practice evolved since the turn of the century. Perhaps we could start with Dr. Moldenke, the father of American sand study, who suggested that "the perfect foundry sand would consist of rounded grains, all of one size like little marbles."

When this theory was proved impractical, we adopted a three-screen standard, not by theorizing, but because that happened to be the nature of most sand in use. It later was found that certain sands noted for outstanding performance were four and five-screen material, and our theories had to be revised to conform with results.

The rounded grain versus the angular and subangular provides an argument that still continues, with adversaries pretty equally divided. As to the many other phases of sand study, ranging from the simple to the complex, the search for truth goes on, with intelligent, conscientious foundrymen s t r i v i n g earnestly to reconcile their theories with the practice currently employed.

When one considers the wide diversity of foundry sand practice throughout the world, and the startling results achieved with materials of such opposing properties, he almost is ready to accept the pronouncement of the late Harold Martin, who insisted that he could make castings in any ground that would grow potatoes.

Each innovation in sand practice demands a special approach. Those who refuse to recognize this fact fail at the outset and return to the familiar path. Changing sand practice would seem to be almost as difficult as changing religion. I'm sure that most of us know of shops that have operated with reasonable

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Products of this new works—Porter's 15th refractories plant—will include burned, chemically bonded, plated and plain brick, mortars, castables, plastics and ramming mixes of chrome and periclase compositions. A unique double-burning process employed in producing Porter periclase grain insures basic refractory products of the highest quality.

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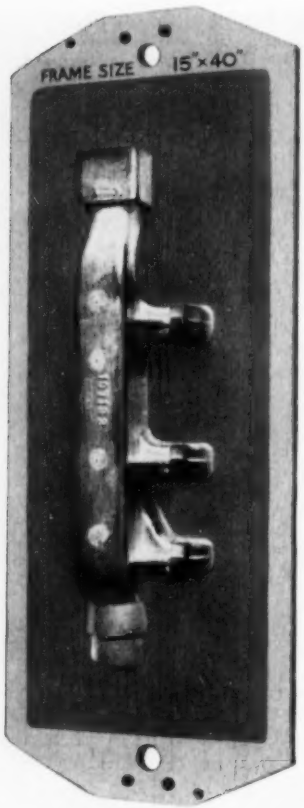

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Circle 655 on Page 53

How to make fork truck investment pay bigger returns

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Circle 656 on Page 53

success for many years, sticking closely to well worn formulas for oil-sand cores. Of course, they have their troubles, and at intervals resolve to get out of the rut by turning to newer methods.

After trying resins and other special binders, they might have a fling at CO_2 or shell, but some expect too much too soon, and the ingrained habits of long years do not condition them for new problems. Many of them decide, "It is better to bear the ills we have, than fly to those we know not of!" Thus they return to the old practice.

Shell Molding—This sort of pattern has been especially true with regard to the shell process. Those who looked on this new method as a panacea for their sand problems have been largely disillusioned. To the successful pioneer in any field, bravery and persistence are essential qualities, and it is gratifying to learn that our industry is well endowed with these virtues. The promised rewards of shell have opened a new phase of sand practice, with concepts that as yet are not fully achieved.

The relative merits of rounded grain, angular and subangular sand revitalize all of the old arguments for the shell men. Screen spread again must be reviewed, with regard to how it affects the flowability of sand and the stability of mold and core surfaces. In our large eastern plants, where facilities and venture capital are adequate, the foregoing problems may have been solved. Here in the West, however, we are very much in the experimental stage. Many of our questions, being unanswered, only provoked added questions.

I have been accused of being anti-shell, even of depreciating the entire process. If that impression has become general, I certainly have failed to make myself understood. The shell process is revolutionary in its concept. It unquestionably is the most exciting innovation that foundry sand practice has experienced within the memory of my generation. Its appeal to the imagination knows no bounds, and its proponents—or at least some of the more articulate ones—seem unrestrained in their enthusiastic phophecies.

But, however great the potentials of the thin-baked core and mold,

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there must be limiting factors, and these will not be disregarded by the foundryman of long experience. As previously hinted, I am sincerely indebted to the shell men for their inspiring example of adventurous curiosity.

I wish them all the success and rewards they richly deserve, for they have broken bravely from a traditional treadmill that might have stifled our industry. They have demonstrated clearly that sand, as a molding medium, can be made to perform in a most spectacular manner without the aid of water.

Alger Has Faded—I would like to believe, in the Horatio Alger

tradition, that virtue is always rewarded, that the deserving pioneer receives full recognition and compensation for the benefits he has bestowed upon posterity. I would like to believe, but it seems that Alger has lost much of his luster for the modern generation. Even your old sandman has become cynical.

I'm inclined to believe that the ultimate rewards of the shell process will be reaped by men other than those who sacrificed their time and money in the perfection of the method. However pessimistic this observation, I'm sure that it will discourage none of the pioneering spirit. I am equally assured that the energy and money devoted to the advancement of shell will teach lessons that unquestionably will promote other phases of sand practice.

There surely is something contagious in the very nature of the enthusiasm which shell has aroused. Directly or indirectly all foundrymen should benefit, even those who milk their neighbor's cow through the fence. It will be interesting indeed to watch the progress of this new method, and even more interesting to contemplate its impact on the development of other methods.

FUNDAMENTALS IN THE PRODUCTION AND DESIGN OF CASTINGS,

By Clarence C. Marek

This book stresses the fact economy of production as a basic requisite of good casting design. Techniques, skills and practices in casting production are all developed in such a manner as to support the principal objective—that of correlating casting design with economical production.

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- Foundry Production Equipment
- Production Planning
- Physical and Metallurgical Properties of Cast Metals
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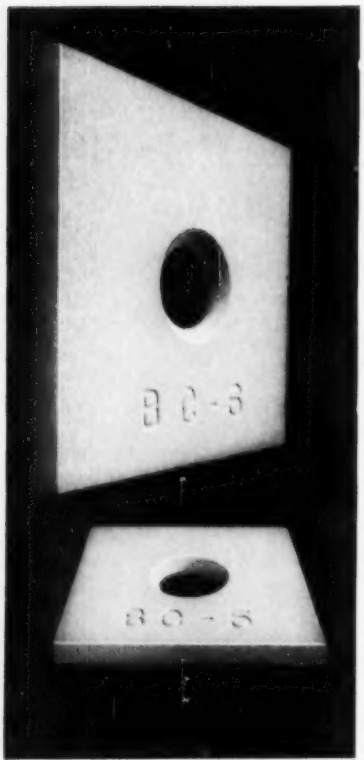

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Foreign Foundry Practice

The abstracts presented here were prepared from articles which appeared in recent issues of Russian, German, and Japanese technical publications

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Plant produces large iron castings up to 48 tons for heavy machines and turbines which are made in semi-permanent molds that can be used 6 to 12 times. This results in 25 per cent saving in labor, shortens the production cycle by 17 per cent, reduces fuel consumption 30 per cent, and cuts molding material in half. During 1954-55 some 17,000 tons of castings were made by the process.

A method has been perfected for hardening core surfaces. At first an aqueous solution of sodium silicate (30-35 per cent) was used. At present a mixture of equal parts of KB binder (sp gr 1.2) and sulfite malt grain (sp gr 1.2) is employed. This gives excellent results in hardening and enables production of castings without sand adherence. Using this practice about 14,000 tons of castings were produced last year with considerable reduction in defective castings and improvement in surface cleanliness.

To speed up melting, one cupola has been equipped with a preheated, oxygen-enriched blast supplying 706.2 cu ft oxygen per ton of iron. This has made it possible to increase the temperature of the molten metal 20 to 25 per cent and to increase melting rate by 25 per cent.

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Elimination of air from the working areas reduces back pressure, making it possible to reduce casting wall thickness by 40 per cent because of increased strength. With thinner-walled castings it is possible to use heat treatment for improvement of mechanical properties without danger of swelling due to presence of air bubbles in the castings.

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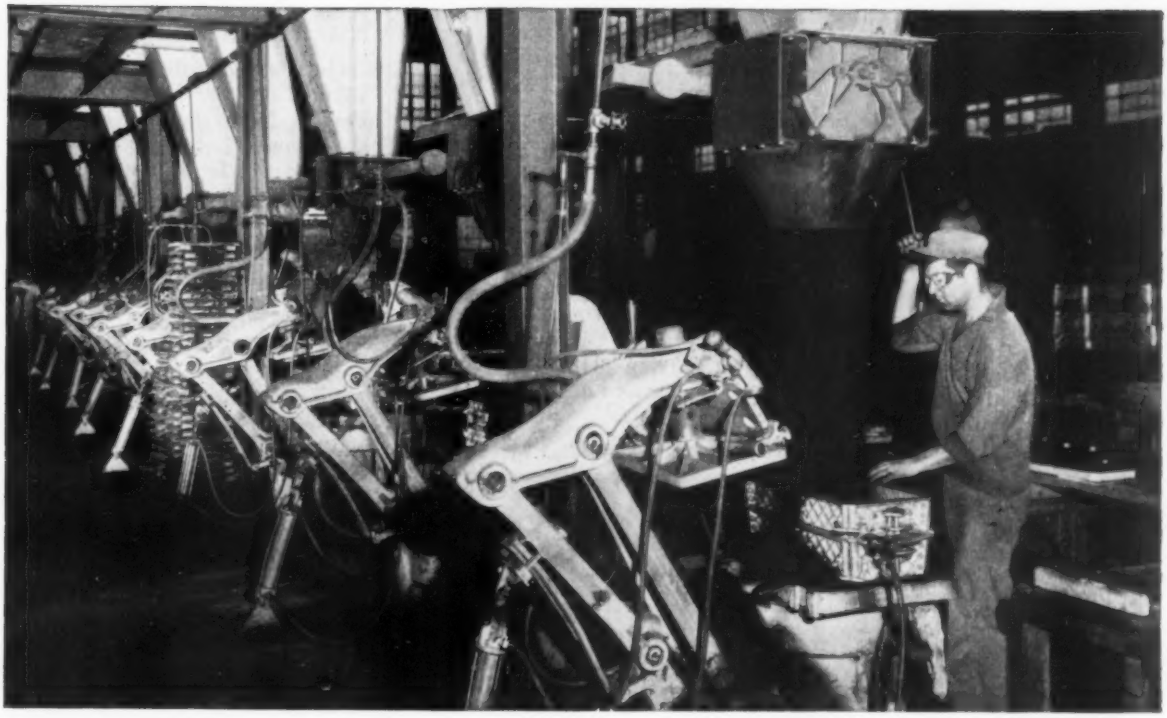
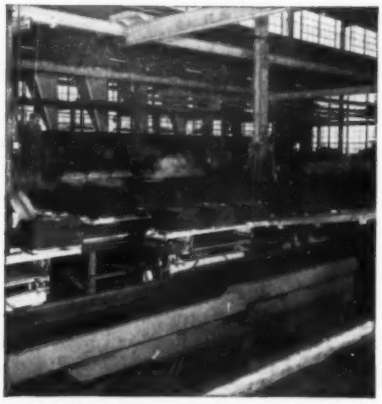
JEFFREY helps modernize A. C. Williams Co. foundry at Ravenna, Ohio



Jeffrey hoppers supply sand directly to molders' stations; save considerable time, effort and floor space.



Jeffrey MV conveyors move material with non-sliding, hopping action that assures long deck life; abrasive wear is negligible.

Jeffrey equipment played a major part in improving plant efficiency when A. C. Williams Co. modernized its foundry. Jeffrey overhead sand distributing systems, MV conveyors, aerators and apron conveyors are being used.

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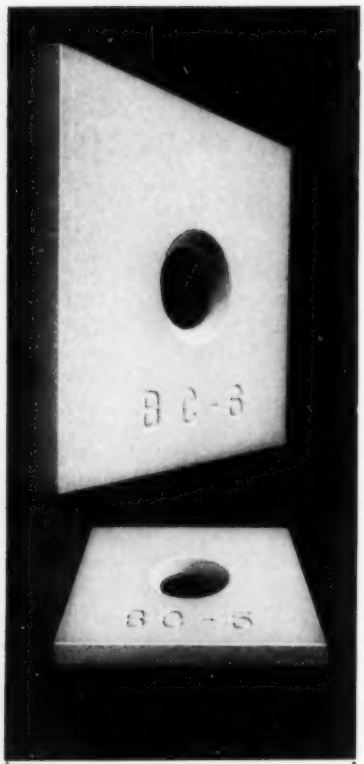

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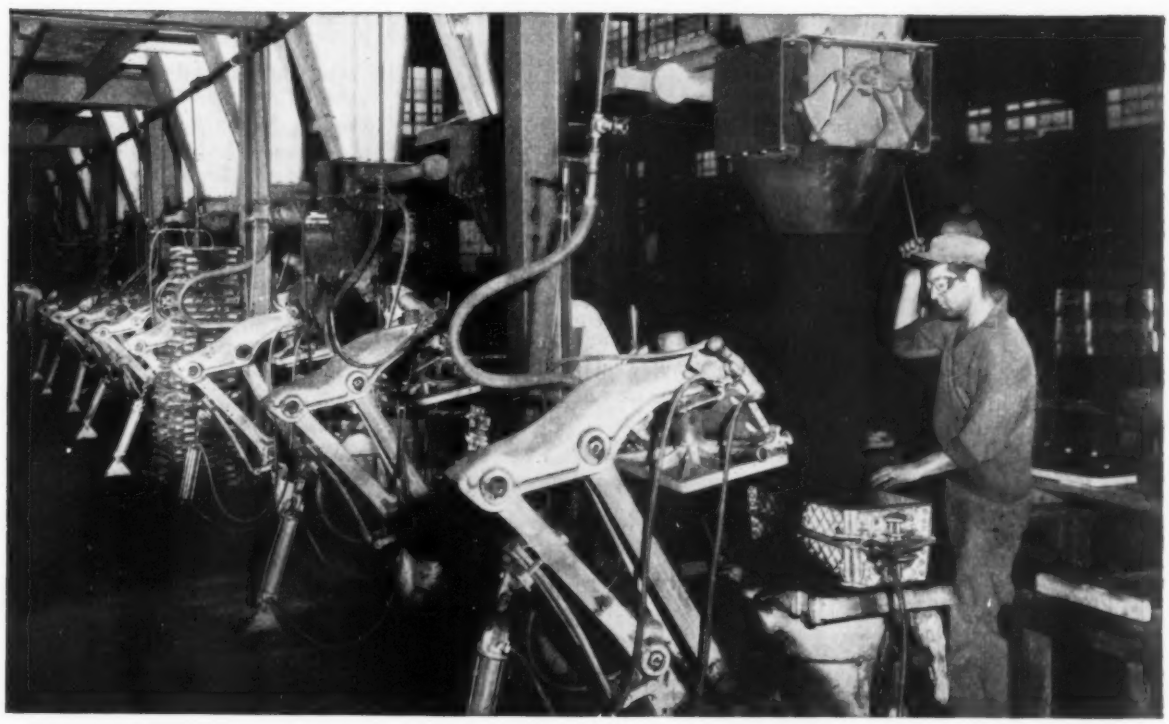

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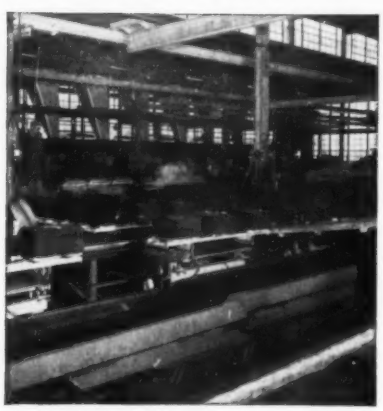

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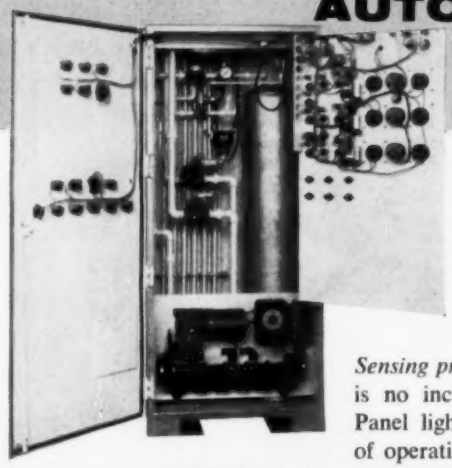

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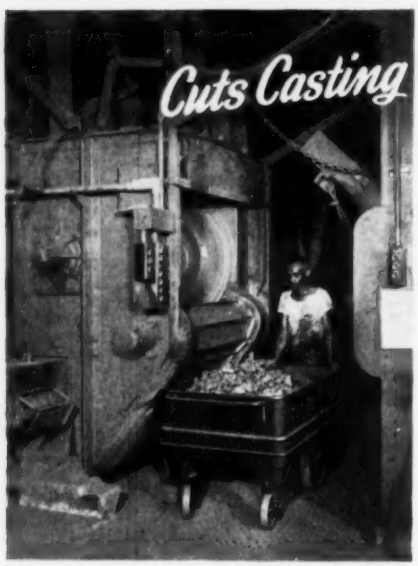

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Illustration shows one of 25 Sterling Heavy Duty Trucks in daily use at the Green Foundry, St. Louis, Mo.

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diboride are formed which cause a particularly refined structure through formation of nuclei. Chlorine gas in nascent state contributes to purification and degassing of the melt. Yield strength, elongation, hardness, Charpy impact strength, and fatigue strength are improved.

RISER DIVIDER CORES

Quick-drying High-strength Dividing Cores for Easily Separable Feeding Heads by A. Ya. Kulbitskaya and G. S. Dvali, *Liteinoe Proizvodstvo*, September, 1958.

At Transcaucasian Metallurgical plant, partitioning plates for dividing large risers into sections for easy removal are prepared from quartz sand and sodium silicate binder and do not require drying or firing.

The mixture consists of 80 per cent quartz sand, 20 per cent molding sand and 7 per cent sodium silicate with a ratio of 1 to 2.5-2.6. Permeability of mixture in the green state is 119 to 138, and after air drying is 163 to 193. Compression strength, green, is 21.3 to 24.2 psi and after air drying is 142.2 to 213.3 psi. Moisture in green state is 3 to 4 per cent.

Plates have a smooth surface and do not crumble. Sticking in corebox is prevented by wiping with kerosine. They can be stored for a long time, and can be set in the mold for a considerable period before pouring without losing their physicochemical properties. They do not cause gas injection into the metal.

Gray Iron Founders Sponsor Clinics on Casting Design

How to cut costs in designing and processing gray iron castings is the subject of one-day clinics being sponsored throughout the country by the Gray Iron Founders' Society, National City—East Sixth Bldg., Cleveland 14.

Intended for designers and engineers, the clinics feature 1) design possibilities exclusive with gray and ductile iron, 2) ultimate economies to be realized by "designing-in" the inherent properties of gray iron, 3) new services being offered by informed foundrymen, and 4) recently developed short cuts in designing castings. Charles Walton, society

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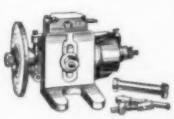
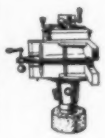
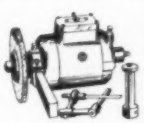


VERTICAL SPINDLE GRINDER



TOOL POST GRINDER



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technical director, and Richard Meloy, marketing director, are conducting the sessions.

First session was held Jan. 14 in Cleveland, followed by St. Louis, Jan. 29; Los Angeles Feb. 3; San Francisco Feb. 9; Seattle Feb. 12; Pittsburgh Feb. 17; Philadelphia Feb. 19; Milwaukee Feb. 24; Chicago Feb. 26; New York March 10; Newark, N. J., March 11; Cincinnati March 18; Dayton, Ohio, March 19; Detroit March 24; Lansing, Mich., March 26; Indianapolis March 31.

Hartford, Conn., April 7; Boston April 9; Minneapolis April 14; Toronto April 28; Dallas May 12; Houston May 14; Atlanta May 19; Birmingham May 20.

Classes are limited to 40 men. Registration ($25) includes a copy of the new *Gray Iron Castings Handbook.*

Investment Casters To Meet In Santa Monica, in March

Members of the Investment Casting Institute will hold a western meeting at the Surf Rider Inn, in Santa Monica, Calif., March 17-19. The three-day program will include a special design and use clinic as well as a full technical session.

The investment casting design and use clinic, to be held Tuesday, Mar. 17, under direction of R. E. Gray, vice president, Gray-Syracuse Inc., Syracuse, N. Y., will be conducted in the civic auditorium. Attendance will be by invitation only.

A tentative list of papers to be presented at the technical session includes: "Inspection Techniques of First Articles and Production Parts," Lloyd Hufstutter, Ryan Aeronautical Co.; "Producibility," John Workman, Convair Div., General Dynamics Corp.; "High-Temperature Materials Creep and Stress Fatigue," Hal Block, AiResearch Mfg. Co.

"Kem Milling of Investment Castings"; "Development of Investment Cast Rifle Chambers"; "Presentation of New ICI Standards for Surface Finish and Inspection"; "Up-to-Date Investment Casting Equipment Review"; "Future of High-Temperature and Corrosion-Resistant Alloys"; "Effect of Vibration on Castings"; "Latest Development of Shell"; "Gating of Castings in Shell."

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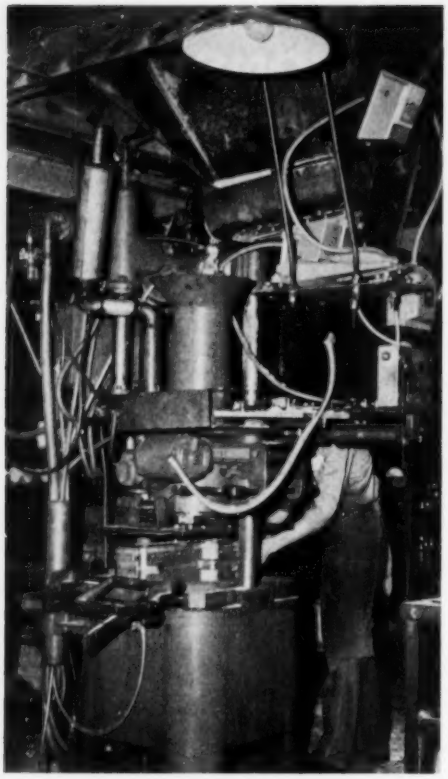
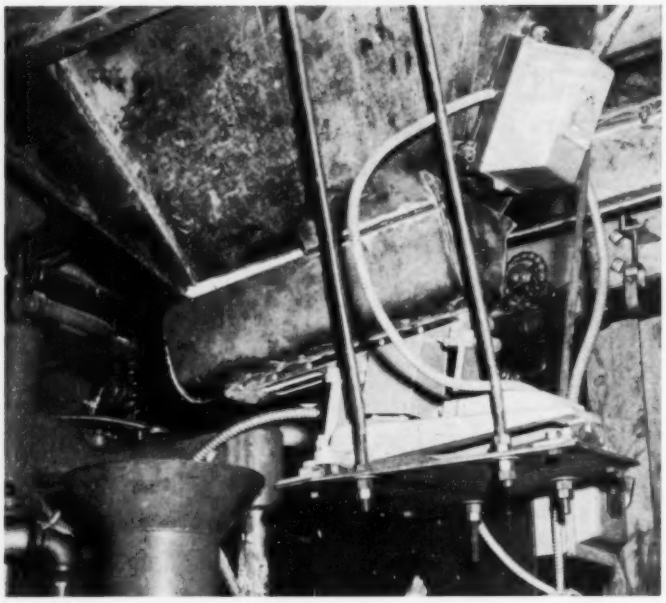




Left—Vibrator attached to hopper prevents sticking or arching in bin. Vibratory feeder directly under hopper maintains preset, unvarying flow of core mixture into coreblower. *Above*—A closeup of vibrator and feeder

Magnetic Vibratory Units

KEEP CORE SAND MOVING

THE INSTALLATION shown here at International Harvester Co.'s Memphis Works solved a material handling problem in the coreroom.

The problem consisted of getting a mulled mix of sand, binders, and water to feed smoothly and dependably from a hopper into a new core blower. The solution was achieved by installing an Eriez bin vibrator on the wall of the bin, and mounting an Eriez vibratory feeder under it. The first unit prevents sticking or arching of material in the bin itself, while the feeder maintains a preset, unvarying flow of the mix into the core blower.

Both the vibrator and feeder have a unique electro-permanent magnetic drive system which produces high-frequency pulsating vibrations of great strength. They do not require rectifiers or special wiring.

Steel Founders' Accident Rate Drops to Lowest on Record

Winners of the 12th annual safety contest sponsored by the Steel Founders' Society of America have been announced. Held during June, July, and August, the 1958 contest had 126 entries and 65 winners, compared with 132 participants and 55 winners last year.

Total manhours of exposure were 15,095,000, number of lost time injuries was 194, and average frequency rate of 12.9 was the lowest ever recorded. Frequency rate showed a drop from last year's rate of 16.1 and 22.0 in 1956.

Records were judged in four groups set up on the basis of number of manhours of exposure per month. Highest honor safety awards were provided for the foundry with the best record in each group. Certificates of safety achievement were awarded those foundries whose cumulative frequency rate for the contest period was 10.0 or less. The winners follow:

HIGHEST HONOR AWARDS

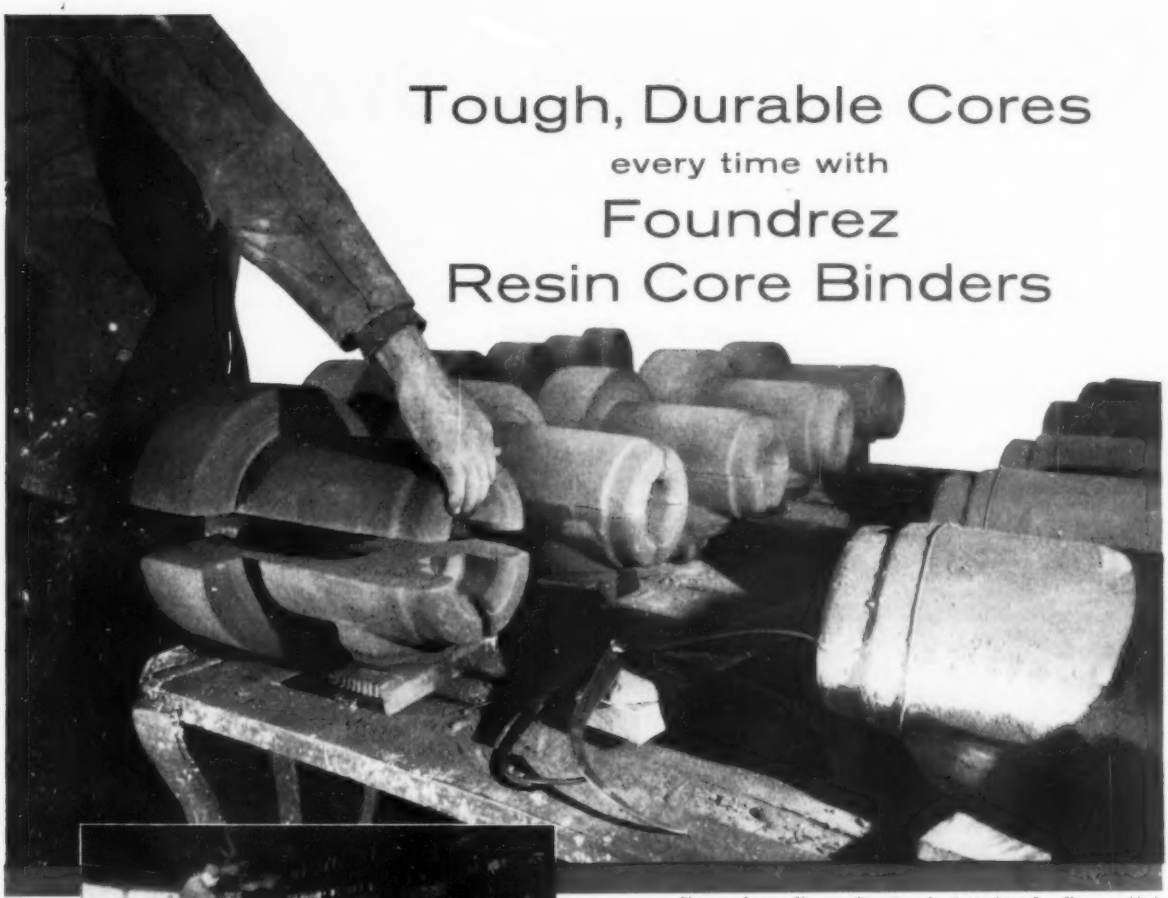
(Group No. 1, 1-20,000 Manhours)

Worthington Corp., Harrison, N. J.; Deemer Steel Castings Co., New Castle, Del.; Hartford Electric Steel Corp., Hartford, Conn.; Caldwell Foundry & Machine Co., Birmingham; LFM Mfg. Co., St. Joseph, Mo.; Pacific Steel Casting Co., Berkeley, Calif.; Eastern Malleable Iron Co., Wilmington, Del.; Alloy Cast Steel Co., Marion, Ohio;

Tough, Durable Cores

every time with

Foundrez Resin Core Binders



Photos taken at Florence Pipe Foundry & Machine Co., Florence, N. J.

Volume production of heavy castings demands that the cores used by Florence Pipe Foundry & Machine Company stand up under rough handling. Florence secures the high tensile strength and hardness needed in these cores by using RCI FOUNDREZ 7100 series resin binders in their molding sand.

These water dispersible phenol-formaldehyde core binders are especially formulated for use where baking time is at a premium. In addition they possess higher hot strength and slower collapsibility than either core oils or urea-formaldehyde binders.

These resins are used in conventional core sand mixtures containing cereal binders and water. Only half as much FOUNDREZ as regular core oil is required to produce equivalent core handleability. Reichhold's FOUNDREZ 7100 series includes:

Foundrez 7101 — a high solids binder compounded for foundries where core gas is a problem. Extremely effective in producing cores with high strength and hardness.

Foundrez 7102 — formulated for very rapid baking schedules, this binder provides excellent green strength with a minimum of cereal binder.

Foundrez 7103 — features easy collapsibility and a low viscosity which permits ready mixing.

Foundrez 7104 — combines a high degree of stability with high tensile strength. Resultant cores are extremely moisture resistant — may be stored for long periods without fear of moisture pickup.

For complete technical data on the FOUNDREZ 7100 line write Reichhold — ask for Bulletin F-1-R.

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Stainless Foundry & Engineering Inc., Milwaukee; Malleable Iron Fittings Co., Branford, Conn.; Arneson Foundry Inc., Kenosha, Wis.; Treadwell Engineering Co., Easton, Pa.; Standard Brake Shoe & Foundry Co., Pine Bluff, Ark.

Youngstown Alloy Casting Corp., Youngstown, Ohio; Vulcan Steel Foundry Co., Oakland, Calif.; Forging & Casting Div., Allegheny Ludlum Steel Corp., Ferndale, Mich.; Hughes Tool Co., Houston; Texas Foundries Inc., Lufkin, Tex.; Westlectric Castings Inc., Los Angeles; American Cast Iron Pipe Co., Birmingham; Walworth Co., Greensburg, Pa.; Calumet Steel Castings Corp., Hammond, Ind.; Omaha Steel Works, Omaha, Nebr.; Atlas Foundry & Machine Co., Tacoma, Wash.; National Supply Co., Torrance, Calif.; Washington Iron Works, Seattle.

(Group No. 2, 21-40,000 Manhours)

Fahralloy Canada Ltd., Orillia, Ont., Canada; Texas Electric Steel Casting Co., Houston; East Texas Steel Castings Co., Longview, Tex.; Crucible Steel Casting Co., Cleveland; Sterling Steel Casting Co., Monsanto, Ill.; Los Angeles Steel Casting Co., Los Angeles; Duriron Co., Dayton, Ohio; Mid-Continent Steel Casting Corp., Shreveport, La.; Unitcast Corp., Foundry No. 2, Toledo, Ohio; St. Louis Steel Casting Inc., St. Louis; National Roll & Foundry Div., General Steel Castings Corp., Avonmore, Pa.

(Group No. 3, 41-70,000 Manhours)

Crucible Steel Casting Co., Milwaukee; Maynard Electric Steel Casting Co., Milwaukee; National Malleable & Steel Castings Co., Sharon, Pa.; Dodge Steel Co., Philadelphia; Crucible Steel Co. of America, Harrison, N. J.; Foundry & Mill Machinery Div., Blaw-Knox Co., Coraopolis, Pa.; Farrell-Cheek Steel Co., Sandusky, Ohio; American Steel Foundries, East Chicago, Ind.; Foundry & Mill Machinery Div., Blaw-Knox Co., Wheeling, W. Va.; Oklahoma Steel Castings Co. Div., American Steel & Pump Corp., Tulsa, Okla.; Pittsburgh Steel Foundry Corp., Glassport, Pa.

(Group No. 4, 71,000 and Up Manhours)

Buckeye Steel Castings Co., Columbus, Ohio; Dominion Foundries & Steel Ltd., Hamilton, Ont., Canada; Foundry & Mill Machinery Div., Blaw-Knox Co., East Chicago, Ind.; General Steel Castings Corp., Granite City, Ill.

CERTIFICATE AWARDS

(Frequencies as indicated)

United Engineering & Foundry Co., Vandergrift, Pa. (3.1); Ohio Steel Foundry Co., Lima, Ohio (4.4); Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. (5.0); American Steel Foundries, Alliance, Ohio (5.1); General Steel Castings Corp., Eddystone, Pa. (6.4); Harrison Steel Castings Co., Attica, Ind. (6.7); Falk Corp., Milwaukee (7.4); Electric Steel Foundry Co., Portland, Oreg. (8.8); Pelton Steel Casting Co., Milwaukee (8.8); American Steel Foundries, Granite City, Ill. (9.0); National Malleable & Steel Castings Co., Melrose Park, Ill. (9.3); Atlantic Foundry Co., Akron, Ohio (9.6); Adirondack Steel Casting Co. Div., Consolidated Foundries & Mfg. Corp., Watervliet, N. Y. (9.6).

Texas Regional Conference Program Is Announced

Program for the Texas Regional Conference, to be held at the Menger Hotel, San Antonio, March 19-20, has been completed. Technical sessions will include three general meetings and nine sectional meetings.

The conference is sponsored by the Texas Chapter, American Foundrymen's Society.

C. R. McGrail, Alamo Iron Works, San Antonio, is chairman of the general conference committee.

Program details follow:

Thursday, March 19

10 a.m.—General Meeting. "Shell Cores," Herbert von Wolff, Shalco Corp., Palo Alto, Calif. "Which Core Process," Anton Dorfmueller Jr., Archer-Daniels-Midland Co., Cleveland.

12:30 p.m.—Luncheon. Speaker, Lewis H. Durdin, president, American Foundrymen's Society.

2 p.m.—Steel Meeting. "Dry Air vs Oxygen for Carbon Reduction," John Bridges, Cameron Iron Works, Houston.

2 p.m.—Nonferrous Meeting. "Aluminum Casting Quality Control," D. L. LaVelle, American Smelting & Refining Co., South Plainfield, N. J.

2 p.m.—Gray Iron Meeting. "Developments in Cupola Design and Operation," Ralph A. Clark, Union Carbide Metals Co., Cleveland.

3:40 p.m.—General Meeting. "Pattern Engineering," P. B. Croom, Houston Pattern Works, Houston.

7 p.m.—Texas Barbecue and Entertainment.

Friday, March 20

9 a.m.—General Meeting. "Self Hardening Binders," O. J. Myers, Reichhold Chemicals Inc., White Plains, N. Y. "Carbon Mold Materials," Day E. Cutler, J. S. McCormick Co., Pittsburgh. "Modern Concepts of Refractory Coatings," Gordon W. Gottschalk, Thiem Products Inc., Milwaukee.

12:30 p.m.—Steel Roundtable Luncheon. "Heat Treatment of Steel Castings," Charles F. Lewis, Cook Heat Treating Co. of Texas, Houston. "Steel Melting for Castings," L. J. Venne, Union Carbide Metals Co., Cleveland.

12:30 p.m.—Nonferrous Roundtable Luncheon. "Aluminum Melting and Pouring Practice," T. E. Kramer, American Alloys Corp., Kansas City, Mo. "Brass and Bronze Melting Practice," Edward Mooney, Benj. Harris Co., Chicago Heights, Ill.

12:30 p.m.—Gray Iron Roundtable Luncheon. "Cupola Refractories," T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Skokie, Ill. "Gray Iron Metallurgy," V. H. Patterson, Vanadium Corp. of America, Chicago.

3:40 p.m.—Steel Meeting. "C Process," Dale Davis, Oklahoma Steel Castings Co., Tulsa, Okla.

3:40 p.m.—Nonferrous Meeting. "Brass and Bronze Casting Quality Control," Ray Cochran, R. Lavin & Sons Inc., Chicago.

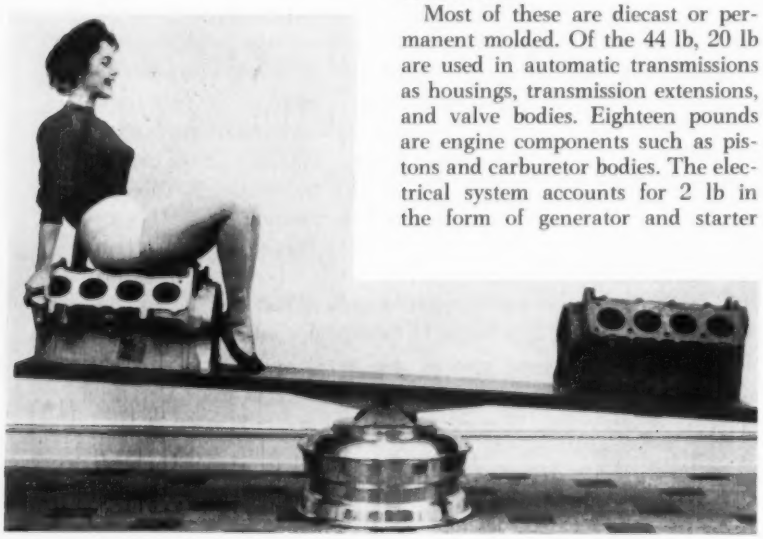
3:40 p.m.—Gray Iron Meeting. "Gating and Risering," David Matter, Ohio Ferro-Alloys Corp., Canton Ohio.

7:15 p.m.—Banquet. Speaker, Dr. Harold Vagtborg, Southwest Research Institute, San Antonio.

Average 1959 Car Has 44 Pounds of Aluminum Castings

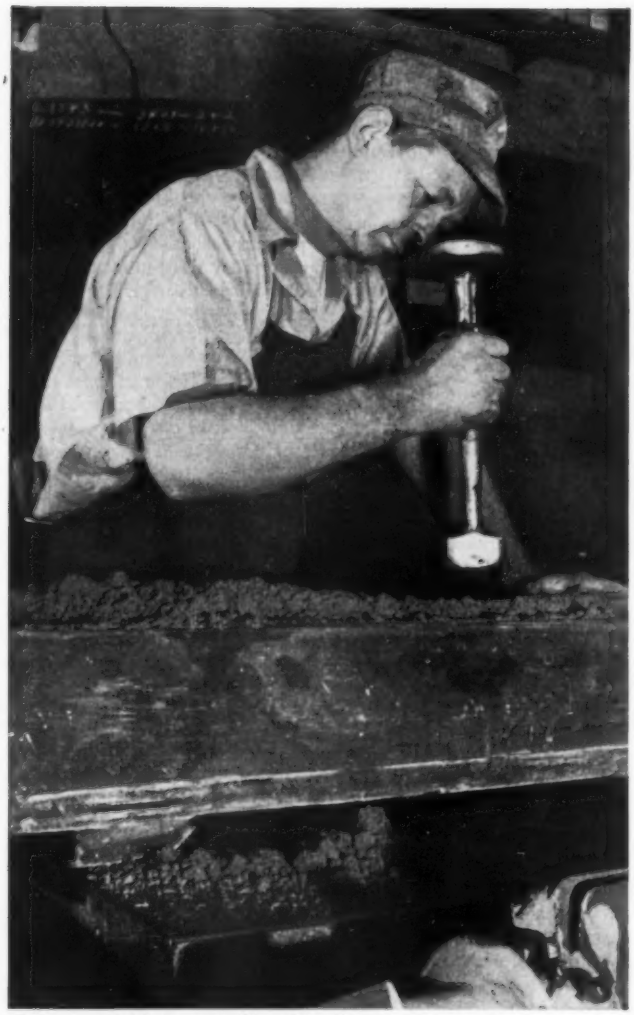
● THE AVERAGE 1959 U. S. passenger car will contain about 44 lb of aluminum castings, according to figures developed by the commercial research division, Aluminum Co. of America. Total average use of aluminum, including parts made by all manufacturing processes, is expected to be 51.58 lb. Thus, castings account for about 85 per cent of the total.

Most of these are diecast or permanent molded. Of the 44 lb, 20 lb are used in automatic transmissions as housings, transmission extensions, and valve bodies. Eighteen pounds are engine components such as pistons and carburetor bodies. The electrical system accounts for 2 lb in the form of generator and starter motor end plates, distributor parts plus wire and cable connectors. Hardware parts such as bumper guards and window raising mechanisms use 2 lb. Brake drums and hydraulic cylinders take about 1½ lb. Parts for power steering and decorative trim take less than 1 lb. If industry production estimates of 5.5 million 1959 autos are realized, over 240 million lb of aluminum will go into automotive castings.



If auto companies were to use an aluminum V-8 engine comparable in size to current engines, cars would use about 180 lb of the light metal. The block and two heads would account for approximately 130 lb. As shown in the accompanying illustration a 115-lb girl sitting on a 90-lb aluminum block almost balances the conventional 220-lb block. The prototype aluminum block was cast in Alcoa's Cleveland sand foundry as part of an engine development program conducted by Alcoa and American Motors Corp.

Save Up To 50% In Core Baking Time!



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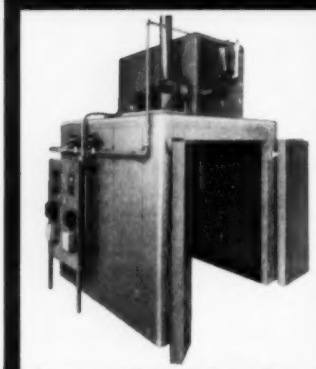

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MAKING A SUGGESTION PROGRAM WORK

Proper Organization and Management Do Job

By Donald J. Wood

JOHN DANIELS is a machinist for a midwestern company which manufactures automobile parts. A few years ago the company started an employee suggestion program which offered cash awards for acceptable suggestions. Each worker whose idea was accepted received a maximum award of 50 per cent of the total savings for the first year, and $5 was the minimum award. John Daniels devised a conveyor system which expedited production by more than 3 per cent. For his idea, he received $5500.

There are thousands of men like Daniels in industry today—men on the front line of production whose ideas save industry millions of dollars annually. Nevertheless, during the last ten years the mortality rate of suggestion systems has been abnormally high. It is estimated that at least 90 per cent of all programs fail, primarily because management does not organize and manage the operation of the plan properly.

Company Is Too Ambitious—The experience of a packing company on the West Coast illustrates how profitable ideas of workers can elude management.

Gordon Park had been personnel manager for the corporation for nearly two years. During this time he had tried to convince management that a suggestion program should be adopted. Finally, his persistence bore fruit, and it was decided to inaugurate a plan under his direction. Details of the plan such as eligibility of suggestors, what might be suggested, and promotion of the program were left to his discretion.

He spent two months surveying other outstanding plans throughout the country and finally submitted a plan at a staff meeting. One of the conditions Park included was that only production workers could participate in the plan. Sales personnel, office workers, foremen, and supervisors were to be excluded.

This exemption created a furor. After much debate, it was decided that if the company was going to have a program, all workers, regardless of department or rank, were to participate.

Park conceded that it probably was a good idea to have all workers included in the program, but he believed that it was wiser to start only with production workers and to include other departments as the plan matured. However, he was overruled.

As it developed, Park was swamped with all kinds of suggestions. His small staff was overburdened, and he was unable to screen and evaluate all suggestions and, of more importance, to give personal interviews to those whose suggestions were rejected.

This experience illustrates one reason for the failure of suggestion plan programs. The success of any suggestion system depends on the attitude of the employees. They must feel that the system affords them a square deal and that their suggestions are considered carefully. It also is imperative that the leader of the program acknowledge all suggestions immediately upon receipt. If an idea is rejected, he should notify the employee immediately and give the reasons for rejection. This system could not be followed with Park's limited staff, and it wasn't long before the program slipped into misuse and disuse.

Careful Study and Evaluation—Students of industrial management at times have difficulty selling management on the advantages of a well conceived and organized suggestion system. The case history of a food manufacturing company in the Midwest illustrates how this requirement can be met.

The company had been owned and managed by its founder for 30 years and had grown and prospered under his guidance. The owner was not a student of industrial management, but by hard work and some luck he had built the company from a one-room operation to a company with a gross revenue in the millions annually. All supervisors and managers had been promoted from the ranks and in most cases had adopted the same management methods as conceived by the founder.

Finally, the owner realized that there was a need for an industrial relations manager. Ed Beach, a veteran of 10 years in personnel work, was hired as industrial relation manager. He studied the operation carefully for six months and devised a master industrial relations program for the food company.

One of the suggestions was that the company start a contest called "Operation Waste." This was a

A Lester B. Knight & Associates, Inc. Case History

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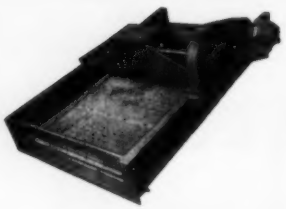

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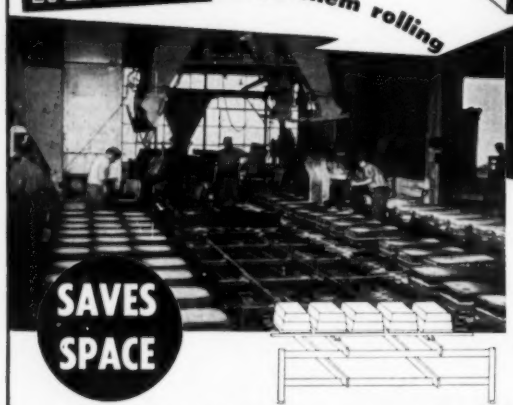

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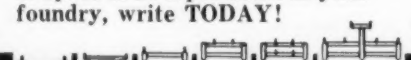

NOMAD FOUNDRY EQUIPMENT

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modified suggestion program which was to run for only one month. Workers would be informed that they would receive cash awards for any suggestion relative to improved operation that would eliminate a wasteful practice.

Beach planned that if the program was successful, other contests would be sponsored on safety, production methods, etc., and that eventually the company would develop a large-scale suggestion program. He did not, however, think that the company was ready for a full-scale suggestion plan.

The owner of the company wholeheartedly endorsed the plan, but warned Beach that this plan was new to most of the workers and that he would have to sell each one on the benefits of the plan if it was going to succeed. He said that he appreciated the fact that any company program must have the solid support of management, down to the front line of supervision. The attitude of supervision toward the program would mean its success or failure, he noted, and in his company, management would have to be trained, indoctrinated, and sold on the plan.

Beach agreed that success of a suggestion system is dependent on active and enthusiastic support of management. Consequently, he suggested that Operation Waste be tabled temporarily so that he would be able to talk to each foreman.

He found many of them distrustful of any type of suggestion program. They maintained that it was their job to make suggestions, that they should be the idea men in their departments.

He returned to the owner and suggested that a training program be initiated immediately with the sole purpose of indoctrinating management about all phases of a suggestion system and about the relationship of the supervisor to the employee in the program.

In the training, foremen were instructed that teamwork is vital to

Circle 669 on Page 53

any successful company and that the criterion of a successful leader is the development of his employees. They were told that they, more than any other group in management, could stimulate employees' ideas by suggesting to the workers specific problems on which suggestions were needed. After this intensive training period, Operation Waste was started.

It would be inaccurate to say that the program was a tremendous success, for many foremen persisted in their original attitude. There was some success, however, and since that time other contests have been sponsored, each more successful than the previous one.

This success was due not only to the training of the foremen, but also to the fact that each foreman received a percentage of his workers' awards. Eventually, they became sold on this management tool. Now the company is about to embark on a full-scale suggestion plan.

Developing a Program—In addition to management support, a successful program requires these ingredients: 1. There must be a leader. 2. Eligibility of suggestors must be clearly defined. 3. Employees must know what suggestions may be made. 4. Incentives must be adequate. 5. The program must be dramatically promoted. 6. Investigations and replies must be prompt.

There Must Be A Leader—The director of a suggestion program may devote all or part of his time to the program, but in all instances the leader of the program must have 1) enough time to do the job properly and 2) an adequate clerical force to answer requests, appeals, and complaints.

It is the responsibility of the leader to sell the program to management and the working group. It is his department's responsibility to collect suggestion forms, review plans, and arrange for periodic (preferably weekly) committee meetings. He and his department prepare notices of rejections or acceptance, write formal answers to all employees who submit ideas, and take the time for a personal interview with each suggestor to prevent any misunderstanding or bitterness.

Eligibility Must Be Defined—The company studies its own operation and determines its own eligibility rules. Ordinarily, all employees with the exception of the supervisory force are eligible to compete.

What May Be Suggested—The subject matter of suggestions must be defined clearly. Generally, suggestions include any or all of the following subjects: 1. New or improved products. 2. Increased production. 3. Savings in time, labor, or material. 4. Promotion of the general welfare. 5. Safety recommendations.

Incentives Must Be Adequate—By participating in the suggestion program, an employee gains the opportunity to express himself to management. He has a chance for personal recognition and the satisfaction of seeing his idea in use, and the average employee is as interested in the personal recognition that he will receive as he is in the monetary awards. The leader of suggestion programs emphasizes that the key to success is to give employees a feeling of importance. Awards therefore usually are made either at special dinners or before other plant workers.

Industry also has found that when presentations are made, it is a sound practice to include the immediate supervisor in the ceremony. This step helps to sell the plan to the front line of management and makes the supervisory staff a participant in the program.

Most companies have established the policy of a $5 minimum award. The minimum varies from $1 to $25, but the average is around $5. Many companies offer a maximum award of 10 per cent of the annual savings to the company; others specify given amounts.

Promote It Dramatically — The suggestion program is more than a box on the wall or a slip of paper. Its value rests with its promotion—for example, the use of the house organ, bulletin boards with regularly changed posters, slips in pay envelopes, and the ceremony of presenting awards to winners.

Investigate and Reply Promptly—The success of any suggestion system depends on the attitude of workers. They must feel that their suggestions are carefully and fairly screened and evaluated and that the award is commensurate with the value of the idea.

These are the ingredients essential to development of a successful suggestion plan program. The following are the benefits such a plan offers to the company: 1. Employee relations are improved. 2. Dollar savings from the plan more than support the program. 3. Production is increased. 4. New products are introduced. 5. Safety is encouraged. 6. Working conditions are improved. 7. Grievances and strikes are minimized. 8. Workers take an increased interest in their work and in their company.

Circle 670 on Page 53→

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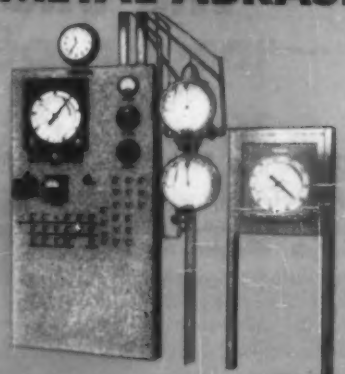

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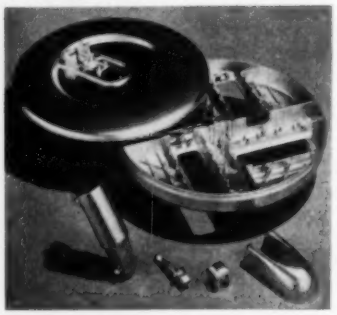
New G-2 MALLEABRASIVE

The Shakeout

Diecastings Make Up Carpet Sweeper



WHEN imported from Sweden, a carpet sweeper of revolutionary new design had a total of 21 components designed largely for fabrication from sheet metal. As redesigned by Interstate Precision Products Corp., Anaheim, Calif., in close co-operation with a member of the American Die Casting Institute, it now is composed essentially of the six aluminum diecastings shown here.

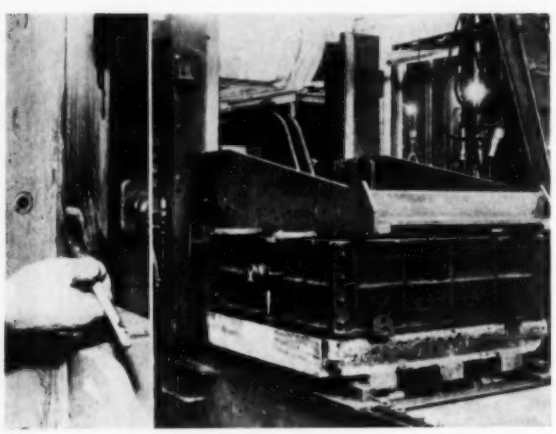
The new design retains all the cleaning efficiency of the Swedish unit, but simplifies assembly so that the sweeper can be priced to insure mass distribution in the American market. One part now serves in place of several, and the diecastings are virtually ready for assembly as received from the custom diecaster.

For More Details Circle No. 497—Page 53

Colloidal Graphite Ends Scoring Problem

USE OF a colloidal graphite dispersion solved what promised to be an expensive problem at D. J. Murray Mfg. Co., Wausau, Wis. The problem involved a new rollover machine which was installed at the company's foundry division.

Slides of the large machine were lubricated with dry graphite at first, then with rosin. In spite of these



lubricants, the slides became scored and rough enough to cause vibration while the machine operated. The solution came in the form of dag 35, one of a family of colloidal dispersions produced by Acheson Colloids Co., Port Huron, Mich.

With its application, machine operation improved immediately. The small scores are said to have all but disappeared, and the deeper ones are filling up. The rollover is operated an average of 90 times daily, and one painted application of the colloidal graphite dispersion is made each day. In eight hours, production amounts to 60 tons of material.

For More Details Circle No. 498—Page 53

Special Steel Increases Casting Die Life

A SERIES of field tests at Arvin Industries Inc., Columbus, Ind., revealed that life of a casting die could be increased from an average of 8 to 40 hours to an average of more than two years by use of a special tool steel.

Arvin makes seal rotor laminations for fan-forced electric heater motors by centrifugally casting alumi-

num around the laminations with motor shafts already inserted. Die life was an average of 8 to 40 hours, and two men were kept busy full time producing molds.

Allegheny Ludlum Steel Corp. engineers suggested a switch to a 5 per cent chromium, 1 per cent vanadium tool steel characterized by toughness and resistance to wear at high temperatures. Inserts which shape the rotor ends are made from a high-speed steel. The new dies average more than two years without failure.

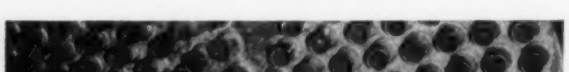
For More Details Circle No. 499—Page 53

Chains and Slings Get Bright Finish

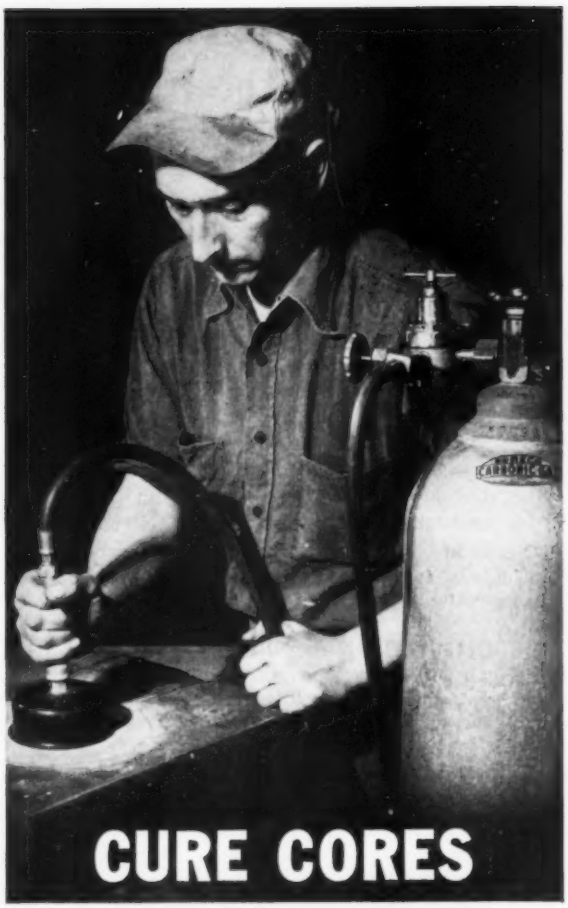
A NEW finishing process developed at American Chain Div., American Chain & Cable Co., York, Pa., eliminates grime, oil, dust, scale, and rust from the company's chain components and slings.

The process requires two separate operations. First, chains and slings are shot blasted for five minutes. After blasting, they are protected with a clear, rust-inhibiting solution which dries like clear lacquer and does not come off on hands.

For More Details Circle No. 500—Page 53



Weld cast iron to carbon steel



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Circle 671 on Page 53

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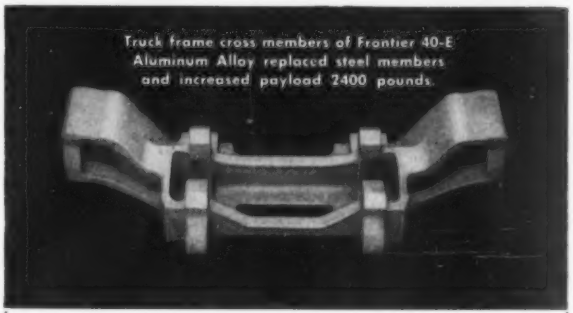

Truck frame cross members of Frontier 40-E Aluminum Alloy replaced steel members and increased payload 2400 pounds.

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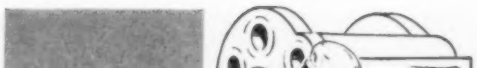

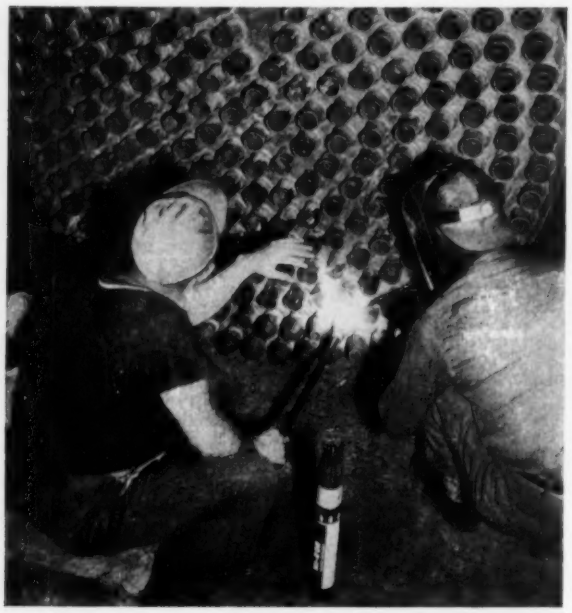

Tack-welding cast iron cones to carbon steel vortex tubes of gas scrubber. Ni-Rod "55" Electrodes make ductile, crack-free joints. Scrubbers made by Aerotec Corp., Greenwich, Conn.

Weld cast iron to carbon steel ...No preheat...no cracking... with Ni-Rod "55" Electrode

Joints were cracking up – between cast iron cones and carbon steel tubes in these gas scrubbers. Welds made with iron and mild steel electrodes were just too brittle – they cracked when chipped, broke when shipped.

Weldors switched to Ni-Rod "55"* Electrodes, and now they're standard. Why? Steven Paulo, Aerotec Superintendent says, "I've never seen a crack in a Ni-Rod '55' weld. And any weldor with normal skill can do a good job." Ni-Rod "55" offers you another big advantage – rarely do you have to pre-heat.

You can get trouble-free welds between cast iron and mild steel in all your jobs – with Ni-Rod "55" Electrode; available from most jobbers.

See in Inco's booklet "Repair Cast Iron Parts Quickly and Easily" how other shops pare costs. Yours for the asking.

*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.

INCO WELDING PRODUCTS

ELECTRODES • WIRES • FLUXES

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Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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SALES • SERVICE • STOCK • COAST TO COAST

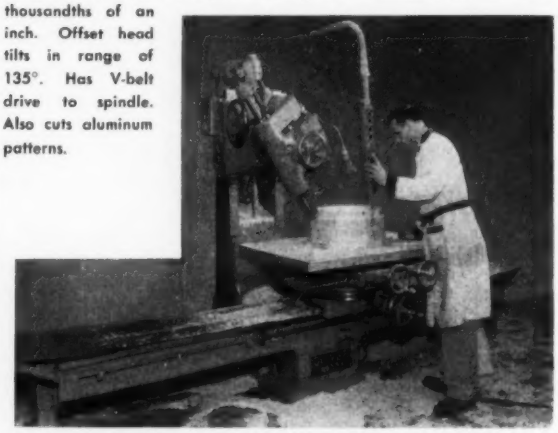
Circle 674 on Page 53

OLIVER Pattern Miller

(for wood and soft metals)

cuts production time 25%

In small and large pattern shops the Oliver No. 103 Miller is unmatched for reducing pattern costs. Saves time on small patterns too. Handles an unlimited variety of operations: core box work, grooving, trenching, jointing, routing, gear cutting. Also square bends, S-bends, socket ends, valve boxes, etc. Every cut is accurate within a few thousandths of an inch. Offset head tilts in range of 135°. Has V-belt drive to spindle. Also cuts aluminum patterns.



Write for Bulletin No. 103

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

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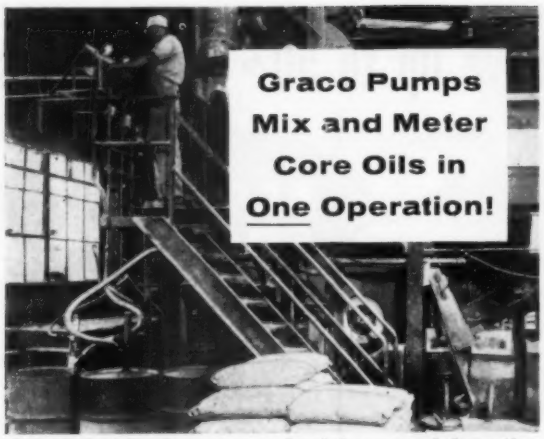
WHY POUR YOUR PROFITS AWAY?



Graco's Fast-Flo Pumps can increase the efficiency of liquid handling operations. As photo shows, core oils and additives are being selected by foundry worker. They'll be transferred in regulated amounts, then mixed with sand in metered quantities. Pump uses air only when delivering fluids. Can empty full size drum in less than three minutes.

Send for more information about this amazing Graco Fast-Flo pump that's especially suited for modern fluids handling. The economical Fast-Flo can transfer, agitate and dispense. Use it as a supply pump, for mixing or spraying. It handles fluids as thin as alcohol, as thick as glue. Here's the pump that can save you money.

FREE IDEA BOOK
SHOWS GRACO PUMPS
FOR EVERY NEED.
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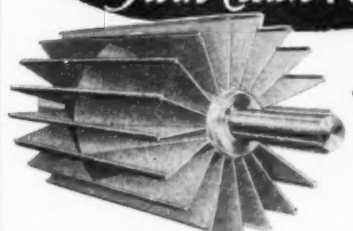
(See Phone Book Yellow Pages, Spraying, for Graco Suppliers)

Circle 676 on Page 53

STOP! MISALIGNMENT USE VAN GORP *Turn-Clean* PULLEYS



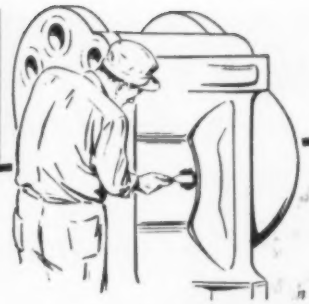
DODGE TAPER-LOCK *SIZES* 8" to 60"

Van Gorp Self-Cleaning Pulleys are designed to stop costly, troublesome problems. Individual wing construction insures automatic positive cleaning action because rotation of the pulley discharges all foreign material to the sides of the pulley. No more abrasive belt wear! Conveyor belts are always properly aligned!

Rugged, all welded steel construction makes Van Gorp Pulleys durable and capable of top performance even under the most severe working conditions. BIG PULLEYS — up to 5 feet in diameter and 5½ feet in face width and a 10-inch maximum bore. Be wise, specify Van Gorp Self-Cleaning Pulleys. Write for FREE Catalog.

Van Gorp Mfg. Inc.
PELLA, IOWA

Circle 677 on Page 53



These features mean

BETTER LOOKING CASTINGS

TIGHT, LASTING REPAIRS

When correcting blow or sand holes, surface blemishes, or rough and porous areas in castings, you can depend on Smooth-On Foundry Cements, standard of the industry for more than 63 years. They are easy to apply, harden quickly, stay firmly in place.

THREE DIFFERENT SHADES

With 3 different shades to pick from, you know you can get a close match for your castings.

4AA—Light gray, fine texture
4A —Medium gray, medium texture
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UNIFORM QUALITY

Rigid quality control means you can be sure that the strength and color of Smooth-On Foundry Cements will not vary from one order to the next. Every lot of Smooth-On cements is laboratory tested and must satisfy tests for setting time, hardness, and color before it is packed for shipment.

FREE SAMPLES

Why not try one or more of these Foundry Cements at our expense? We will be glad to send you a free sample of any of the cements described above if you will write us on your business letterhead. Write today, and see how Smooth-On can improve the appearance of your castings.

SMOOTH-ON MANUFACTURING CO.
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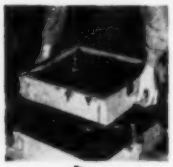
SMOOTH-ON
FOUNDRY CEMENTS

SO-389

Circle 678 on Page 53

When casting Aluminum



or Magnesium

Improve product and process with B&A® ALKALI FLUOBORATES and Potassium Titanium Fluoride

As a purifying flux in aluminum casting, B&A Potassium Fluoborate removes oxides . . . acts as degassing agent . . . forms a dry dross . . . improves fluidity of the molten metal. Subsequent treatment with B&A Potassium Titanium Fluoride, or a mixture of Potassium Titanium Fluoride with Potassium Fluoborate (for lower melting temperatures), produces better grain structure . . . with increased tensile strength, greater elongation, better machinability, and other benefits stemming from improved grain.

In magnesium casting you can reduce rejects by using the Alkali Fluoborates as oxidation inhibitors with both green sand and core sand. Cores are easier to make. They collapse faster. They're easier to shake out.

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Allied Chemical

GENERAL CHEMICAL DIVISION
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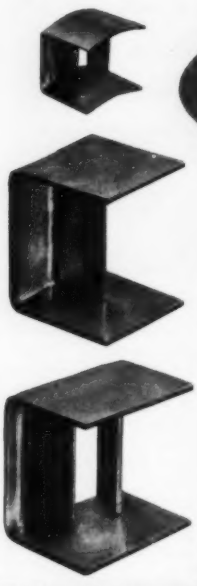
Circle 679 on Page 53

WHY POUR YOUR PROFITS AWAY?

save up to 50% on chaplets



Buffalo **ECONOMY CHAPLETS**

Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

Furnished in a complete line of sizes and gauges, Buffalo Economy Chaplets are available in tinned steel, Monel, stainless steel and copper. Why not give them a trial? It costs only pennies to find out how many dollars you will save.

Write for literature on Economy Chaplets. For information on the complete "Buffalo" line, request Catalog No. 20.

MANUFACTURED BY
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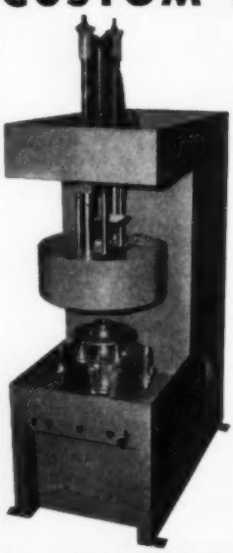
Circle 680 on Page 53

CENTRIFUGAL CASTING MACHINES . . . WITH STANDARD PARTS AND EQUIPMENT CAN BE . . .
CUSTOM BUILT



We make machines capable of producing castings weighing **MANY TONS** as well as machines to produce castings weighing a **FEW OUNCES.**

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Some machines are designed for long-run repetitive production, while other special machines are most suitable for short runs of varying sizes and types of castings.

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WE FURNISH INFORMATION ON **HOW** TO MAKE CENTRIFUGAL CASTINGS

INQUIRIES INVITED

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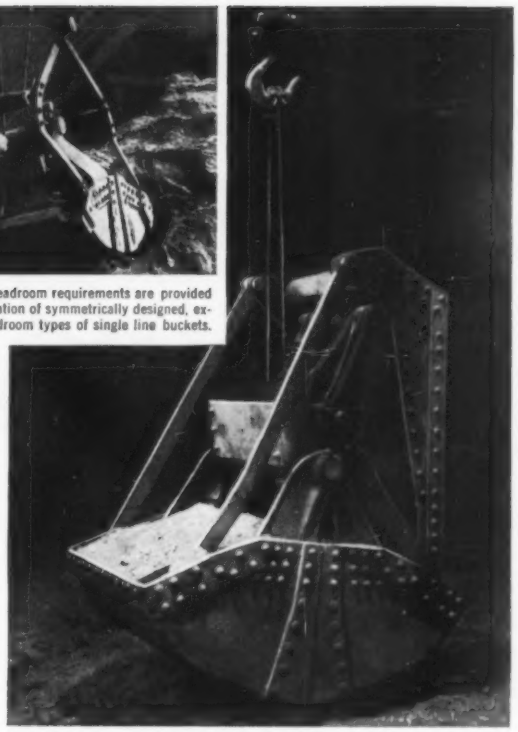
Circle 681 on Page 53

Blaw-Knox single line type buckets improve foundry handling operations

Unusually low headroom requirements are provided for by the application of symmetrically designed, extremely low headroom types of single line buckets.



Normal headroom usually accommodates standard Blaw-Knox Foundry Buckets of either the open head or closed head types.

Blaw-Knox single line, hook-on type foundry buckets are especially designed for efficient operation under all types of headroom conditions. In addition, their quick—detachable feature permits the bucket to be released instantly, freeing the crane for other duties. Special shark-tooth types are available for handling coke with a minimum of degradation.

Blaw-Knox sales engineers can study your requirements and apply the bucket best suited to your needs.

BLAW-KNOX COMPANY

Blaw-Knox Equipment Division
Pittsburgh 38, Pennsylvania

BLAW-KNOX

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"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

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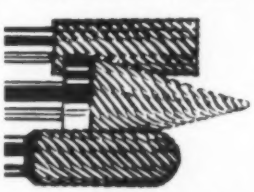

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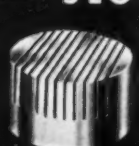
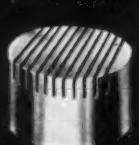


X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH.

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- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
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- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

VENT CLEANER
- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

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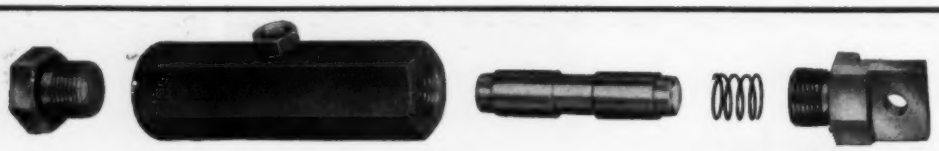
PENN BUCKETS



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Strength and durability are built in . . . preserved . . . through specific steel alloys that give each part of each Branford Vibrator the properties it needs for a long serviceable life.

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When you specify "Branford Vibrators" you receive unmatched performance, longer service, less down time.

Write for your Branford catalog and the name of your local Branford distributor.

*** Branford Vibrators are built in every size—and in every size they are built from steel throughout (including the bodies).**

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STRAIGHTEN, SIZE, COIN

WARPED MALLEABLE IRON CASTINGS

in one operation on the

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The Cecostamp's impact blow not only straightens, but can also coin to close tolerances • 100% restrike in the Cecostamp makes it unnecessary to inspect and size castings manually, piece by piece • No longer is it necessary to laboriously stack castings in annealing baskets to minimize distortion • In many cases, close tolerance restrike reduces casting weight and minimizes machining operations • The Cecostamp is an air-powered Drop Stamp; rapid, safe, easily operated • Dies are simple, inexpensive • Applications often displace larger, more expensive presses • Write for complete details.

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By Charles W. Briggs
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A comprehensive work giving detailed data on the chemistry, metallurgy and technology of steel castings. Provides complete information on methods of technical and industrial control in production of steel castings and describes every manufacturing process used.

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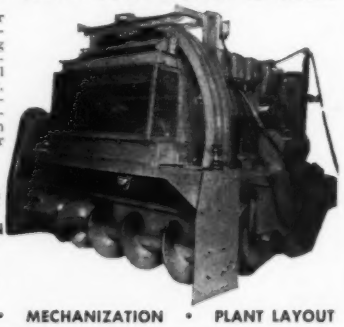

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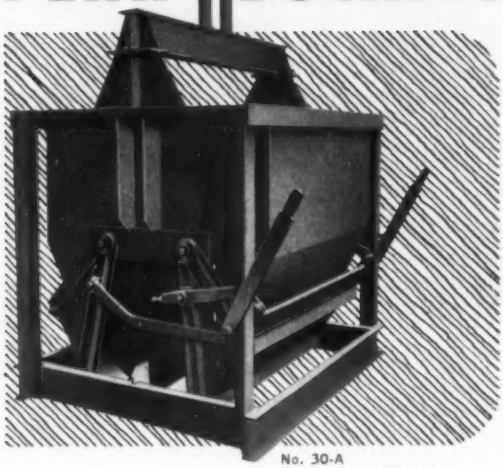

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This book contains practical information on almost every production problem steel foundrymen encounter.

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Diamond Chemicals

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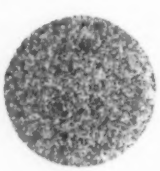

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Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.
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MODERNIZATION

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Circle 696 on Page 53

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CORE WORK, SAND FACINGS, SPRAYS

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If you need help to solve an industrial waste treatment problem, here are two quick steps to the right solution! *First,* send today for your copy of informative Bulletin No. 5578, which gives you a quick picture of what CHAIN Belt Waste Treatment Equipment and processes can do to solve your problem. *Second,* ask for a Rex Man to review your problem and help you select the equipment which will provide effective treatment of your industrial waste. For action, just mail the coupon!

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CHAIN Belt Company 700
4692 W. Greenfield Ave., Milwaukee 1, Wis.
(In Canada: CHAIN Belt (Canada) Ltd.,
1181 Sheppard Ave. East, Toronto)
☐ Send me Bulletin No. 5578.
☐ Have a Rex Man call.

Name.....
Company.....
Address.....
City.....*Zone*.....*State*.....

Circle 698 on Page 53

CLASSIFIED ADVERTISING

Help Wanted

SUPERINTENDENT MALLEABLE

Progressive Ontario foundry requires a superintendent who has the ability and initiative to help operate a medium-sized malleable plant. This man should be in the age bracket 32 to 42. He must have good labor relations. In full confidence state details of education and experience plus salary requirements.

BOX 388, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

INDUSTRIAL ENGINEER

Experienced in foundry operations as well as general industry. Capable of taking over management of industrial engineering division of ACME member consulting firm. Degree necessary. Age 35-45. Send complete details and include recent photograph. All replies held in confidence.

BOX 407, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCTION MANAGER

Steel foundry in Northern California seeks man to fill position of PRODUCTION MANAGER. Applicant must be 30 to 40 years of age with a minimum of three years' foundry experience. Engineering background desired as well as thorough knowledge of patterns, sand, mechanization. Knowledge of CO_2 and shell cores preferable. Please submit resume of experience and education. Interested in salary desired and availability. Address: Box 348, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTING SALESMAN

Gray iron foundry located in southwestern Ohio, desire salesman with selling and foundry experience to call on present accounts and develop new accounts. Person chosen should have ability to progress to management. Furnish complete details including age, weight, height, experience, education, salary desired and references. Address: Box 398, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN FOR BRASS FOUNDRY

We need a man who is experienced as supervisor of green sand molding, core blowing and CO_2 core freezing methods. We must reduce our scrap loss and better our techniques. We are a small foundry making castings for our own use only. An excellent opportunity for the proper man. Write or telephone: MR. EDWARD H. LINER, PRESIDENT, BOSTON BRASS COMPANY, INC., 137 BACON STREET, WALTHAM, MASSACHUSETTS, TWINBROOK 3-3800.

GRAY IRON FOUNDRY SUPERINTENDENT

Experienced, high-class man wanted, prefer age range 30 to 45. Exceptional opportunity for young man with ambition. Present operations profitable and prospects good. Starting salary commensurate with ability. Address: P. O. DRAWER 139, HUNTSVILLE, ALABAMA.

NONFERROUS FOUNDRYMAN

With good training in metallurgy and sound practical experience, who has supervisory qualities to assume direction of sand, permanent mold and centrifugal foundry department of northeastern Ohio corporation. Give full particulars and references in letter. Address: Box 402, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

ASSISTANT FOUNDRY SUPERINTENDENT

We are seeking a graduate metallurgist with approximately ten years or more experience in all phases of foundry activities. Age 30 to 50 years acceptable. This position will ultimately lead to complete responsibility for all foundry supervision.
Our company is located in north central Wisconsin and is engaged in manufacturing pulp and paper mill machinery, heavy gray iron, ductile and some bronze castings.
Write giving age, complete background and salary expected. Enclose a recent photo.

BOX 392, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SUPERINTENDENT

High class man with experience in gray iron jobbing shop. Relocate Middlewest. Good opportunity.

BOX 389, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Capable man to take charge of all operating departments in well established gray iron jobbing foundry—squeezer, cope and drag, rollover molding operations. Give complete details of experience and record of past operations in resume. Midwest location.

BOX 409, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY METALLURGICAL ENGINEER

For nonferrous foundry (brass and bronze), presently engaged in modernization and expansion program. Must have sound experience in problems of gating, risering, pouring, sand and cores. Salary open and commensurate with experience. Excellent and challenging opportunity for the right man. Will work directly under Foundry Superintendent. Location near New York City. Please write, giving full personal and business resume and state salary desired. All replies confidential. Address: Box 406, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Small squeezer Gray Iron Foundry in southwest Michigan, desire man to take complete charge of matchplate production. Must know cupola practice, sands, gating, patterns, core and cleaning room. Employment 50 men, steady production 18-25 tons per day. Excellent opportunity for qualified person. Give references, experience, availability date and salary expected. Address: Box 399, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

A gray iron foundry research organization requires a technically trained foundryman interested in the application of results of research and development to foundry practice. Must have good knowledge of cupola operation and metallurgy of gray iron. Must be willing to travel. Excellent opportunity to acquire a broad knowledge of foundry practice. Send complete resume on education and experience together with salary requirements. Address: Box 351, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Investment casting foundry on West Coast in process of expanding, offers fine opportunity for man 25-35 years of age. Applicant must have engineering background and preferably knowledge of ceramics or metallurgy. Minimum of two years' experience in industry required. Give complete resume of experience and education. Specify salary desired. Address: Box 346, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT—Assistant

A Wisconsin production gray iron foundry producing quality automotive and agricultural castings, requires an assistant foundry superintendent. A broad knowledge of modern foundry, core room and cleaning room processes, and previous supervisory experience is necessary. Position offers opportunities for further advancement. Company has an outstanding benefit program. Fine living conditions.
Please list complete background in first letter, including references and salary desired.

BOX 385, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PLANT MANAGER—INVESTMENT CASTINGS

New investment casting plant opened by established Midwest foundry. Experienced man required to assume complete responsibility for management of personnel, production, purchasing, tooling design, cost estimating. Must be strong in latest methods and metallurgy, ferrous and nonferrous. Send complete resume. Address: Box 332, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

Brass foundry located in small town, Washington, D. C. area, needs experienced foundry foreman. Must be capable of supervising bench, machine, and shell molding, and all foundry operations. Excellent opportunity for right man. Address: Box 323, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT ENGINEER

Steel foundry in one of the fastest growing cities in the West seeks man 25-30 years of age for challenging position of Plant Engineer. Applicant must have engineering background as well as knowledge of equipment design, maintenance, etc. Minimum of one to two years required. Please submit resume of experience and education. Availability and salary desired also requested. Address: Box 347, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NIGHT FOREMAN

To handle small night labor force on shakeout and sand preparation. Midwest iron jobbing foundry. Interested in reducing labor costs. Submit resume. Replies confidential. Address: Box 380, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POUR-OFF FOREMAN

Foreman for Pour-off Department in gray iron jobbing foundry in Southern Michigan. Afternoon shift. Principal objectives scrap reduction and handling labor efficiently. Vacations, insurance, pensions. Submit resume. All inquiries held confidential. Address: Box 381, Penton Bldg., Cleveland 13, Ohio.

JOBBING STEEL FOUNDRY SUPERINTENDENT

Position requires ability to supervise all operations. Applicant must have practical experience as well as some technical background, and be willing to grow with young concern. Medium-size foundry located in south. Send full resume with recent photo if possible. All replies will be treated confidentially. Address: Box 378, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Medium-size gray iron production jobbing foundry wants qualified young man to establish and maintain standards for incentive system and to plan layout and installation of new capital equipment. Furnish complete details including age, weight, height, experience, education salary desired and references. Address: Box 397 FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES ENGINEER

Experienced in steel castings. Chicago and surrounding area. Good opportunity for right person. Address: Box 395, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

POSITION WANTED

Former foundryman of Hong Kong now in the States, expert knowledge of steel, iron and bronze melting, sand control, molding, coremaking, gating, risering, troubleshooting and heat-treating. B.Sc. in metallurgical engineering, China, and 3 years' job training in U.S.A. Two years apprenticeship, 8 years' actual working and 10 years' supervisory; age 45. Seeking employment as melter, coremaker, troubleshooter, metallurgist or assistant superintendent. Address: Box 374, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES MANAGER—STEEL CASTINGS

Fifteen years top company. Specialize in Carbon, Low Alloy and Stainless. Presently directing national sales, advertising, sales promotion, engineering. Patents. Foundry manufacturing. Any location. Base $15,000. Complete resume available. Address: Box 379, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY SUPERINTENDENT

Good working knowledge of all phases of nonferrous foundries. Understand gating, sand control in both foundry and core room. Can produce castings for chrome plating. Two and one-half years of metallurgical training. Address: Box 387, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR GENERAL SUPERINTENDENT

Twenty-six years' experience covering all phases of operation in medium sized mid-western malleable foundry. Presently emp'oyed but position unsat'sfactory. Salary open. Address: Box 393, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 360, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE OR SALESMAN

Age 53, eighteen years' experience in gray iron foundry. Production manager and customer relationship for eight years. General management and sales past five years in foundry employing 90 people. Well versed in purchasing, scrap control, costs and labor relations. Address: Box 410, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Age 56, mechanical engineer. Experience 25 years as superintendent and manager of jobbing and mechanized foundry. Desire connections with reliable firm. Now employed. Address: Box 339, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Technical background, good record of quality production. Good administrator, excellent labor relations. Experienced in all phases of gray iron foundry operation. Prefer modern shop with full authority for maximum results. Address: Box 330, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Personable, energetic young foundryman with pattern background, desires challenge. Well versed in ferrous foundry practice and processes, heading and gating, pattern and casting design and shell molding. Address: Box 404, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Well versed in all phases, broad background of experience in light, heavy castings cupola, sand and quality control. Practical foundryman, technically trained. Low scrap and cost record. Desired results produced. Address: Box 405, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER

Graduate Metallurgist with 25 years' experience in light metal castings. Handle all phases of engineering or supervise complete operation. Interested in process development. Address: Box 391, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTER

Electric furnace acid and basic practice, carbon and alloy steels, capable of taking complete charge. Address: Box 362, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

Widely experienced Cleaning Room Foreman available. Address: Box 363, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. — **FINANCIAL 6-8700**
JOHN COPE, DIRECTOR — **29 E. MADISON ST., CHICAGO 2, ILL.**

Positions Wanted

SUPERINTENDENT

Practical and technical 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 364, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 394, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

Young graduate engineer with two years' experience in highly automated nonferrous foundry in midwest. Would like to relocate in southwest. Prefer small progressive foundry with opportunity to engage in all phases of foundry work. Address: Box 403, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR ASSISTANT MANAGER

Young metallurgist and foundryman looking for a growing, progressive, nonferrous foundry to which he can devote energy and ambition in exchange for lucrative future. Foundry experience includes supervision and research plus early trades training. Address: Box 367, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES ENGINEER

Graduate engineer, early thirties experienced in all phases of steel and malleable iron practice. Successfully selling at present in the middle west on a salary basis. Prefer to be compensated for performance. Address: Box 382, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

OPPORTUNITY WANTED

Nonferrous foundryman desires a connection with a brass or light metals shop in which he can invest some capital plus the experience of years of supervision, research and quality control. Presently located in Eastern Ohio. Address: Box 368, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Metallurgical background, 20 years' experience cupola melting, iron and casting quality control, sands, laboratory, production and jobbing. Will relocate, employed, age 48. Address: Box 390 FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultants

HEVERLE & HAY
ENGINEERING—ACCOUNTING
CONSULTANTS TO INDUSTRY
(Since 1907)

COST CONTROL—COST REDUCTION
FOUNDRY METHODS

121 NORTH BROAD STREET
PHILADELPHIA, PA.

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, 253—8th STREET, WEST PALM BEACH, FLORIDA, PHONE: TEMPLE 2-8685.

Representatives Wanted

SALES REPRESENTATIVES

Here is an established competitively-priced line you can count on for a good income. Milward Alloys, a leading manufacturer with a strong reputation is now in the process of localizing many sales areas to give better service to customers and prospects from coast to coast. A considerable number of territories are open. We need men who will take them on, full or part time.

You may now be serving the trade or you may have foundry experience. Maybe you're retired with time on your hands. Regardless of your situation, you will be amply rewarded—because Milward's line is broad and in constant demand. Milward alloys cut foundry costs. Orders are promptly filled. That's why we have a substantial reorder business.

The Milward line includes: Copper shot; phosphor copper and other powerful deoxidizers and degasifiers; aluminum bronze and manganese bronze hardeners and ingots; copper silicon, copper manganese, copper iron, copper aluminum and copper chrome alloys; nickel copper and nickel iron alloys; aluminum titanium, aluminum silicon, aluminum manganese, aluminum iron and aluminum copper and other alloys.

Send us a letter describing the area or locality you can cover, whether full or part time, and tell us a little about yourself . . . your qualifications, experience, and when available. This may well be the connection you've been waiting for.

Write to Mr. David B. Milward, President.

MILWARD ALLOYS, INC.
Lockport, New York

MANUFACTURERS REPRESENTATIVE WANTED

To represent well established aluminum permanent mold and sand foundry in Northern Ohio, Western Pennsylvania and Chicago area. Must have foundry experience. Address: Box 376, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

We would like a man who is currently calling on pattern shops and foundries to sell a complete line of pattern lacquers. Address: Box 373, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

FOUNDRY PRODUCT DEMONSTRATION SERVICE

Nation-wide service available to manufacturers of foundry equipment and supplies. Unique opportunity to have your present product or a new product personally demonstrated inside the prospective customer's foundry. Address: Box 386, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVE

Well established agent, covering New York State, seeking additional lines of mounted points, portable air tools, chisels, and foundry materials handling equipment. Address: Box 408, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

Wanted-To-Buy

WANTED TO BUY

18—Osborn Portable Jolt Squeeze Machines, 10" Cylinders
1—B & P Nite Gang
4—36" x 72" Motorized Tumbling Mills
1—10 x 12 Air Compressor with Motor
4—Single Station Handy Sandys

BOX 384, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Used or broken Silicon Carbide Grinding Wheels of any kind or size, regardless of bond. Will pay $35.00 per ton.

UNION MINING COMPANY
2306 FIRST NATIONAL BANK BLDG.
PITTSBURGH 22, PENNSYLVANIA

FOUNDRIES • WANTED • EQUIPMENT
FERROUS—NONFERROUS

Production — Jobbing — Captive — Nationwide foundry investment organization expanding. Complete foundry with or without property will be considered. All replies confidential. PRINCIPALS ONLY.

BOX 396, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

2000 lb. oil fired furnace for iron; state make, give full description, condition, age and price. Address: GENERAL MANUFACTURING CO., LTD., DRUMMONDVILLE, QUEBEC, CANADA.

LARGE JOLT-SQUEEZER

Wanted used 15"—16" jolt-squeezer such as #216-PJ Osborn or equivalent. Address: PONTIAC FOUNDRY, INC., 2509 E. PONTIAC, FT. WAYNE, INDIANA.

Foundries Wanted

STEEL FOUNDRY WANTED

We would like to buy a small to medium sized steel jobbing foundry in northwestern Ohio or northeastern Indiana. Address: Box 372, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ALUMINUM FOUNDRY WANTED

Making die or sand castings and located in Indiana or Ohio. Must have going volume of business with reliable customers. Address: Box 375, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOR SALE, LEASE, OR JOINT VENTURE

Malleable or gray modern mechanized foundry located on Seaport, Great Lakes Area. Production small castings. Additional 35 ton cupola for floor work.

BOX 400, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Foundries For Sale

MODERN AUTOMATIC BRASS AND ALUMINUM FOUNDRY FOR SALE

Must be sold immediately in whole or in part at far below original cost. All-automatic brass and aluminum foundry with approximate capacity of 150,000 lb. per month of small castings on production basis. Equipment includes 5 Detroit Electric furnaces of 300-500 lb. capacity each. Complete automatic overhead sand system with 10 stations. Complete core room with core blowers and ovens, wheelabrator and cut-off saw. Automatic mold blower with conveyor and shakeout that will produce 800 molds per 8 hour day with 2 operators. System includes overhead monorail, flasks, and pouring equipment. In operation until March 1, 1959, at which time it must be removed from Watertown Mass. WRITE OR WIRE: Sidney Siegel or Sidney Doren, ATLANTIC STEEL & TRADING CO. 365 DORCHESTER AVENUE, BOSTON 27, ANdrew 8-4467.

For Sale

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to carry a complete line of "Hard Chrome Rebuilt Tools" at about half the cost of new tools. Before you discard your old tools, why not send them to us for our estimate on the cost of renewing them with our Hard Chrome Process?

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

$70,000 worth new Pangborn and Wheelabrator parts. Priced 25% less than list.

6' LF-14 Pangborn Table	$2000.00
9' LG-14 Pangborn Table	4500.00
6' LG-14 Pangborn Table	2500.00
Pangborn 14 GK Blaster	
Pangborn 8 x 8 Room	2800.00
Pangborn 53 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tum. w/loader	4000.00
42 x 48 Wheelabrator Tum. w/loader	2500.00
27 x 36 Wheelabrator Tum. w/loader	3000.00
15 x 20 Wheelabrator	1800.00
8' Wheelabrator Table Blast	2000.00
4' Wheelabrator Table Blast	2500.00
14 LG5 Pangborn Rotoblast Multi-table 4/5—5' tables	9000.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Blast Equipment too numerous to mention. Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-3-6750

RANSOHOFF
TUMBLING MILL

48" dia. x 84" length. End loading and unloading automatically. 11 cu. ft. power loader with hoist. NEVER USED—government surplus. Sold at 50% of replacement cost.

MILT GROBAN
9656 S. MERRION AVENUE
CHICAGO 17, ILLINOIS
SA 1-3442

For Sale

FOR SALE

Simpson No. 2 Muller
Fisher Furnaces #600 MNP
Fisher Furnaces #400 MNP
Campbell-Hausfeld Tilt Furnaces
Campbell-Hausfeld Stationary Furnaces
Stedman Core Crusher, Hammer Mill
Skip Hoist for 9½ Foot Cupola—complete
Osborn #405 Rollovers
Mold conveyor 268' long
Elevators
Belt Conveyors
Shakeouts
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion J8L 12 Pin Lift, jolt
Osborn 710J, Pin Lift
Osborn 212J, Jolt Squeezers
Osborn 275J, Jolt Squeezers
Osborn 276J, Jolt Squeeze
International L8J, Jolt Squeeze
International PJ8, Jolt Squeeze
Milwaukee 104 Jolt Squeezers
Champion J8 108 Jolt Squeeze
Arcade 1008 Jolt Squeeze
Spo 110 Jolt Squeeze
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
J & J 610 B rollover portable
International pin lifts
Davenport pin lifts
Osborn 559 pin lifts
Spo 506 jolt rollover, pin lift, draw
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
American Sand Cutters, Models M, AM, AA
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

FLASKS
ALUMINUM
SLIP and POP
Sizes from 10" x 10" to 48" x 48"
JACKETS
Aluminum and Iron
STEEL FLASKS
Sizes from 10" x 15" to 9' x 9'
CORE PLATES
Transite——Iron——Aluminum
MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY—SELL—TRADE

THE HOMAN MACHINERY CO.
710 E. FRONT ST. MAIN 10339
CINCINNATI 2, OHIO

FOR SALE

1—Dextrex Degreaser with temperature controls, stream pressure regulator, 2 baskets, size 70" x 25" x 12". Purchased 1955, slightly used. Price $1200 total.

1—Rotary Lift Hoist, Model F5L2, purchased 1955, never used. Price $900.

1—PRE2 Ingersoll-Rand Air Compressor, 24 x 12½ x 14 stroke, 210 HP, 440 volt synchronous motor complete with excitor, Serial No. 40569-40570.

1—Type 10 Ingersoll-Rand Air Compressor, 17 x 10½ x 14 stroke, 150 HP, 440 volt belt driven motor, complete with reduce voltage compensator, Serial No. 36266-36265.

1—Type #25 Size 8000 CFH DX Surface Combustion Gas Generator purchased new in 1956. Price $5600.

ALBION MALLEABLE IRON COMPANY
ALBION, MICHIGAN

FOR SALE

CHEAP. Hela Cold Saw, takes up to 9" Bar Stock. Complete motor, extra saws, track, dolly, etc.

BOX 401, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

For Sale

FOR SALE

#2 SIMPSON MULLER, Serial No. 80318 UD, 20 HP HOWELL MOTOR, 3/60/220-440. GOOD CONDITION
#2 SIMPSON MULLER (Old Style), 15 HP GE MOTOR (Very good for the price asked)
SPO Jolt-Squeeze Pin Lift #2114G Molding Machines (3) Unusually good machines
MOLDERS' FRIEND 50" Brush with spare brush (One-Way Machine) 15 HP motor (Rebuilt and Guaranteed)
SLY DUST COLLECTOR, 3600 CFM, never used, still in factory crate.
PANGBORN #2 Continuous Cleaning Machine (Used about one year)
WHEELABRATOR Special Pipe-Cleaning Machine (Used one year)
SHEPARD-NILES 5-Ton Electric Hoists (2) one used—one never used (With 180 ft. of monorail for charging)
Other good equipment—Send us your inquiries.

W. O. McMAHON
BOX 5799, HOMEWOOD STATION
BIRMINGHAM 9, ALABAMA
Phone: TRemont 1-2088

FOR SALE

Lancaster Muller, 800 lbs. capacity with Loader $2000
Tabor Power Roll-over, 40" x 30" ..... $ 850
Milwaukee Core Machine, Model 48-A ..... $ 575
Melting Furnaces 90-400 lb. capacity ..... $ 125
Beardsley & Piper Screenarators, Model LM. ..... $ 450
Royer Sanditioner, 1½ HP motor ..... $ 225
Wheelabrator Tumblast, 42" x 36" $2500
Tabor Jolt Pin Stripper, 10" ..... $ 350
Wire Cutter, ¼" ..... $ 175
Pangborn EN2, Sand Blasting Cabinet ..... $ 275

M. ELSTEIN
426 GRAND STREET
JERSEY CITY 2, NEW JERSEY

FOR SALE

1—Ajax 30 KW induction furnace, air cooled, 490 Volt, 4200 cycles. Excellent condition. One year old.

NATIONAL LOCK BOX CO., INC.
21-24—44th AVENUE
LONG ISLAND CITY 1, NEW YORK

THREE USED STOKERS

Riley Multiple 5 retort 21" underfeed, excellent condition, 21 years old, now in operation. Capacity 2,400 pounds per hour. Interested in selling parts of stoker. Also coal handling skip hoists now working with above stokers. Capable of handling a ton of coal. Automatic control panel, excellent condition. Address: **J. W. PRAUGHT, JR. J. W. PRAUGHT COMPANY, 1202 V.F.W. PARKWAY, U. S. ROUTE 1, BOSTON 32, MASSACHUSETTS, FA 3-7000.**

For Sale

FOUNDRY EQUIPMENT

Molding Machine #42 Jolt Roll-Over
Demmler Core Blower, including Sand Elevator
Shell Molding Machine, Model H 04-1483, w/Timer, oven, etc.
No. 998 Crucibles, Loose Lip (15)
No. 150 Crucibles, Loose Lip (13)
Core Blower, Demmler #1
5 Melting Furnaces, Oil-fired, Motorized, Tilt type for Brass. No. 300 Crucible cap. with burners
Blower "Spencer-Turbo" Compressor, 30 HP Motor, 24 oz.—1800 RPM
4 Blowers "Spencer-Turbo" Compressor, 110 CFM, 12 oz., 1½ HP
Portable Conveyor, "Trowbridge"

MR. WARD
BOHN ALUMINUM & BRASS CORP.
WO 3-0655

FOR SALE

WHEELABRATOR 36 x 42, w/skip loader
AJAX INDUCTION FURNACE 35 K.V.A.
BESLEY opposed disc grinder, 23" wheel
HYDROCRANE, Model H-3, with magnet and clam shell
SHELL MOLDING MACHINE, automatic, size 20" x 30"

WELLS MANUFACTURING COMPANY
7800 NORTH AUSTIN AVENUE
SKOKIE, ILLINOIS
INdependence 3-5050
Phone or Write: J. T. Moore

FOR SALE

MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51 — Rochester 1, New York

ALUMINUM SMELTING FURNACES
1—5,000 lbs. capacity—new 1953
1—10,000 lbs. capacity—new 1955
Stroman aluminum reverberatory smelting furnaces, double dipwells, skip load hopper feeds, complete with motor driven blowers, controls and ventilating hoods. Gas fired. Reasonably priced. Location Cincinnati, Ohio area.

PHILADELPHIA TINPLATE CO., INC.
E. YORK & CABOT STREETS
PHILADELPHIA 25, PENNSYLVANIA
GArfield 6-5150

FOR SALE
DETROIT ROCKING FURNACE

Type AA with cylindrical shell, 1200 lb. cold or 2600 lb. hot metal, complete with mechanical and electrical equipment, oil filled Kuhlman transformer 11,000 volts primary, 125 volts secondary, 2800 amperes full load, installation drawings, unused and crated ten years. Ideal for alloy irons, brass or bronze. Price f.o.b. local cars $6,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 39 LONG AVENUE, HILLSIDE, N. J., ELIZABETH 4-7837.

For Sale

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2. 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers. Models, 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

Pangborn Rotoblast Type ES-192, designed for cleaning of bath tubs. Unit complete with Schneible Collector, 825 gallon skim tank—two pumps. Blast cabinet 45' 6" x 11' 6". Seven rotors with 20 HP motors, 36 hooks on trolley conveyor—2 grit elevators, 6 separators. Spare parts inventory included. Unit offered on as is—where is basis.

RHEEM-RICHMOND PLUMBING FIXTURES
DIV. RHEEM MANUFACTURING COMPANY
P. O. BOX 111
METUCHEN, NEW JERSEY
Attention: Purchasing Department

FOR SALE

Four Herman Jolt Rollover Molding Machines, 40" x 68" Rollover Table. Good Condition.

BOX 338, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

Ferrotitanium, Low-Carbon (Ti 22.61%), 20 mesh X down 1,000 lbs. Manufactured by Vanadium Corporation. Priced at 25% discount from list. Address: J. M. HIRSCH COMPANY, 622 WASHINGTON STREET, SAN FRANCISCO 11, CALIFORNIA.

FURNACES FOR SALE

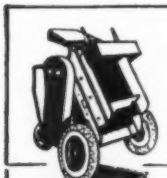
Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: **BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.**

FOR SALE

Lectromelt Type D, size 6, Serial #203, 175 K.V.A. transformer, G. E. Controls. Melting rate 500 lb. per hour. Address: Box 377, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

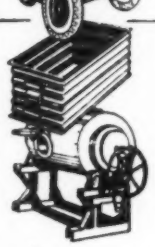
FOR SALE

20—Haynes Portable Molding Machines, 4" Jolt and 12" Squeeze Cylinder. Address: Box 383, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — **CLEVELAND 10, OHIO**



DUST COLLECTOR
1—Whiting Hydro-Clone, wet type, 4,000 c.f.m.

WHEELABRATORS
1—36" x 42", 11½ cu. ft. Tumblast, w/loader
1—42" x 48", 17½ cu. ft. Tumblast, w/loader
1—18 cu. ft. Pangborn Blastmaster

MAGNESIUM CLEANING CABINETS
6—90" x 100" x 65" with exhausters, 8000 c.f.m.

MOLDING MACHINES
1—Rotalifts, 3160
2—TDA4 Taccones

SAND SLINGERS
1—B-P Riddle type, 19" head, 4" tip
1—B-P Motive Jr., 19" head, 4" tip
1—B & P Dbl. Belt type, 19" head, 4" tip

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACE
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

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AIR COMPRESSORS
COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS
25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent, Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—27" x 36" AMERICAN WHEELABRATOR TUMBLAST
1—36" x 42" AMERICAN WHEELABRATOR TUMBLAST
1—48" x 42" AMERICAN WHEELABRATOR TUMBLAST, w/loader
1—PANGBORN TABLAST, 8' Table, 2500 #
1—8LY, Twin Unit, 40" x 24" Round, 10 HP
1—8LY, 68" x 32" Round
4—8LY, 48" x 36" Round

CONVEYORS
1—JEFFREY Car Type Mold, 23 cars, 109' track, cars 34" x 50"
1—HEWITT-ROBBINS Vibrating, 18" W x 10' L, Model VC-1
1—JEFFREY Ingot Mold, 3 compartment type 60' centers
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
1—SIMPLICITY, 24" x 10" Feeder w/hopper, Model OA-10-JA2
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS
10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap. Never used. Fraction of cost!

DUST COLLECTORS
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FURNACES—DIRECT ARC MELTING
1—250 Lb LECTROMELT, Side Charge
1—3000 # HEROULT
1—1½ Ton HEROULT
1—3 Ton LECTROMELT, Door Charge
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

FURNACES—INDIRECT ARC
1—10 # DETROIT
1—350 # DETROIT LFA
1—750 # DETROIT LFY, Conical Shell
1—1000 # DETROIT AA, 300 KVA
1—3000 # DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING
1—3 KW, AJAX, Lab type, steel
1—35 KVA, AJAX SPARK GAP, High Freq., steel
1—17 KVA LEPEL
1—175 KVA, AJAX, Brass
1—333 KW, AJAX, 1000 # steel

REBUILT & GUARANTEED

BEARDSLEY & PIPER

#70 Speedmuller

15 cu. ft. batch with Cooling and Skip Loader

FURNACES—GAS & OIL
1—400 # FISHER MNP, Gas Fired, Alum.
1—STROMAN, Gas, 1000 # cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb, "U" Type
1—1200 # Brass, MNP, Oil

FURNACES—HEAT TREAT
1—2' x 3' x 6', gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—9' x 12' Car Type, gas/oil
1—20" x 36" L&N Draw electric
1—32" x 78" L&N Vapocarb, 83 KW
1—24" x 18" x 65" WESTINGHOUSE, 45 KW w/Endogas Generator

MOLDING MACHINES
Jolt Rollover Pattern Draw
2—J & J #1020, 50" x 60" Table, 3000 #
1—J & J #918, 40" x 48" Table, 15" draw
3—J & J #815RB, 30" x 40" table, 1200 #
1—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 42" x 78"
1—HERMAN 3000 #, 30" x 66" table
5—HERMAN 1500 # to 30" x 48" tables
3—HERMAN 750 # to 30" x 36" tables
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #402, 36" x 26", 900 #
1—OSBORN #405, 3000 #, flask size 64" x 57", 26" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
2—TABOR 30" x 40" w/air clamps, 1000 #
1—TABOR 22" x 42", pattern draw, shockless, portable, 600 #
1—TABOR 20" x 30" w/air clamps, 1000 #
2—TABOR 14" x 16" Rockover, 150 #

Plain Jolt
2—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200 # to 1800 #
1—INTERNATIONAL, 3' x 4' table, 12" cylinder

Jolt Pin Lift
1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #
2—SPO #305, 750 lb
1—TABOR 17" x 20" table, portable
1—TABOR 20" x 24" table, 600 #

Jolt Squeeze Pin Lift
2—INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #, 8" draw
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500 #
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
5—SPO #2114P, 21" x 27" table, 600 #
5—SPO #2136G, 21" x 30" table, 800 #

Jolt Squeezers
2—INTERNATIONAL #12 LJS, 16" x 20" table
4—INTERNATIONAL #10 LJS, 16" x 20"
1—MILWAUKEE #104-5, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600 #
31—OSBORN #275PJ, #275J, 17" x 20" tables, 10" sq., 400 #, stat. & port.
1—OSBORN #276J, 17" x 26" table, 13" squeeze, 500 # port.
2—SPO #110J, 17" x 20" table, port.
1—SPO #113 J, 18½" x 26" table, 13" cyl., port.

MATERIALS HANDLING
1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—HOUGH PAYLOADER, Model HA, 1000 # cap., hyd. lift, mech. dump

MULLERS AND MIXERS
1—B & P #70 Speedmullor, 15 cu ft batch with cooling and skip loader
1—B & P, Conventional, SIMPSON type, 87¼" Dia. arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10 to 14 cu ft batch, w/loader
5—SIMPSON #0, U.D. 3' Dia, never used
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft. batch
1—SIMPSON #2, 6' U.D. Dia, 14 cu ft batch
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu ft batch
1—SIMPSON #3, 8' Dia. Open Gear, 20-25 cu. ft. batch

LADLES AND POURING DEVICES
Bottom Pour
2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 60" top
Lip Pour
2—MODERN 20½" x 20½", covered, enclosed gear
1—WHITING 40" x 40" top dia. geared
Cylindrical
8—WHITING, 26" L x 25" dia, 1100 # iron
7—WHITING 19" L x 22" dia, 600 # iron
3—WHITING, 38" L x 28" dia, 2200 # iron
Pouring Devices
11—WHITING, 650 # to 2000 # gross cap.

OVENS
1—COLEMAN, Oil, Drawer Type, 70" L x 57" H x 48" W
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
1—COLEMAN, Gas, 2 compartments, rack type, each compartment: 7' H x 8' W x 10' D
1—GENRICH, Elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
1—GENRICH, Electric, Rack Type, 7' W x 7' H x 5'3" L
1—PORBECK, oil, 5 drawer core oven
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

SAND CONDITIONING
2—B & P Screenarator, Model "S" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
1—LINK BELT Revivifier
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP motor
1—ROYER, NC-4, 10-15 tons/hr, 1½ HP motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
1—ROYER, NDP 15-25 ton/hr, 2 HP
1—B & P Nite-Gang

SAND CUTTERS
1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel

SAND SLINGERS
1—B&P Stationary, Single Speed
2—B&P Tractor Type, 16" head

SHAKEOUTS AND SCREENS
1—SIMPLICITY Vibrex screen, 3' x 8'
1—ROBINS Vibrating Screen, 36" x 78"
1—SIMPLICITY 50" x 116" shakeout

TESTING EQUIPMENT
1—100 000 TINIUS OLSEN UNIVERSAL Hydraulic Testing Machine
1—500,000 lb. TINIUS OLSEN Hydraulic Compression Testing Machine
1—GOGAN Hand Operated Brinnel Hardness Tester

MISCELLANEOUS
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
FLASKS CORE PLATES, All Sizes
1—TABOR Cut-Off Saw, 7½ HP motor
1—CLIMAX Model 2-A Wire Straightener
10 or 15 HP GRINDERS, Swing Frame
8—GRINDERS, Double End, Pedestal Type, U. S., Cin., Gardner, 5, 7½ & 10 HP

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NEWAYGO

AIR COMPRESSOR
CHICAGO PNEUMATIC DCE 24; 14½ x 17; 2 Stage
6 x 7 INGERSOLL-RAND

BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

BLOWERS
INGERSOLL-RAND 13,000 cfm, 32 oz., 150 hp., 220 V.
INGERSOLL-RAND 10,000 cfm., 32 oz., 150 hp., 220-V.
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm., 24 oz., 58 hp. motor
NORTH AMERICAN 1050 cfm, 16 oz.
SPENCER 7350 cfm, 16 oz., 50 hp.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.
SPENCER 5500 CFM 32 oz., 220 V.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B. WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK-BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK-BELT Oscillating Pan
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.

CORE BLOWERS
DEMMLER #2, 20# cores
DEMMLER #2K, 20# cores
REDFORD Bench types, horizontal or vertical clamping
CB15 55# cores Universal blow plate
C.B. 10 up to 12# cores, 4½" draw
DEMMLER #4 up to 250# cores
FEDERAL "SAN-BLO" CB 40
INTERNATIONAL SB15H, up to 150# cores. Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

CORE GRINDERS
5—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS ELECTRIC
THERMONIC INDUCTION MODEL 1800A

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw
B & P CR 20-10
SUTTER SP 550F

CRANES
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 ton MILWAUKEE; 48' span, 220 V.

CUPOLA GUNS
1—BONDACTOR #1250
BONDACTOR #1000

DIE CASTING
2—LAKE ERIE 800 ton Aluminum 58" x 89" die plates; 9# shot

DUST COLLECTORS
PARSONS 40,000 cfm. cloth bag type
AMERICAN 72 Bag; 3 hp

ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place

ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V.
2—DETROIT "LFC" 350# Tapered shell 7200 V.

FLASK HOIST—ROLLER CONVEYOR
NATIONAL 24"; 8' long table

FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

FURNACES NONFERROUS
CAMPBELL HAUSFELD Staty. pot type
1—HEVI-DUTY HD-181-S Pot type, Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 Gas Fired Crucible
3—CAMPBELL HAUSFELD Gas Fired 625# brass hand tilt
1000# STROMAN DC double dipout w/complete controls

GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 2" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

GRINDERS, MISC.
PORTER CABLE BG8 Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric
LINDBERG 48" x 48" x 72" Elec., 1250°, box type.
BELLEVUE INDUSTRIAL GAS PUSHER
HAGAN OIL PUSHER

HOISTS
10 ton SHAW BOX electric hoist
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Gear Crane
3—2125# Industrial Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE table, 24" x 30"
2—#125-3 MILWAUKEE table, 21" x 27" —12" cyl.
2—OSBORN 712 PJ, 18" x 21" table
1—CHAMPION J8L10P 18" x 21" table 6" draw
2—#2114 G. SPO table, 26" x 27"—11" cyl.

SPECIAL! FACTORY REBUILDING
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff — rolling molding machines 10" jolt cylinder; 1800# capacity, 26" Squeeze cylinder; 13" draw, Flask size 25½" to 29" wide, 52" long. New 1951. WILL BE FACTORY REBUILT.

2—SPO 2302 Automatic Jolt Squeeze strip rollon, rolloff; NEW 1955

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ
MILWAUKEE 214—244 Jolt Squeeze car type

JOLT ROLLOVER DRAWS
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
1—1500# HERMAN 26" x 48"
2—750# HERMAN 20" x 30" table
1—INTERNATIONAL RJ 20" x 12"
3—SPO 9032

JOLT PIN LIFTS
2—INTERNATIONAL 1200-8 26" x 27" table, 8" draw

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
2—#1 SIMPSON Mullers
SIMPSON #2

SAND CUTTERS
1—ROYER MCZ-43

SAND SLINGERS
1—B&P Tractor, 19" heads
B&P 2 speed 40/25 hp. double belt

SAND SYSTEMS
2—NEWAYGO SUPER HANDY SANDY; like new

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

SAWS, CUTOFF
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SHAKEOUTS
3' x 5' ROBBINS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
4' x 10' SIMPLICITY

SHOT BLAST
SLY #4, 20" x 20" w/dust collector

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #55 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
TYLER ROTAP Testing Sieve w/screens

TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loaders
1—27" x 36" AMERICAN Skip Loader
AMERICAN 1A Tablast 6-24" tables
AMERICAN #2 Tablast 8-28" tables, late
Hollingsworth 27" x 36" with bucket loaders

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc
OLIVER 72DR Router or borer
BOICE CRANE 12" Planer
TANNEWITZ 30 & 42" Band Saws
1—YATES AMERICAN 8" Jointer
2—OLIVER 182D, 15" Disc Sanders
1—WALLACE 8" Jointer
2—STATE 15" Disc Sanders
1—OLIVER 88D Table Saw
1—TANNEWITZ, Type U Table Saw
1—CRESCENT 24" Planer

EKSTROM CARLSON #540 Universal Router Mill Drill

WIRE STRAIGHTENERS
2—#2A CLIMAX ¼"

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ACME EQUIPMENT CO., INC.

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over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS
1—AMERICAN Size 9 x 9, horiz. w/30 hp
1—KELLOG Model 350TV—5½ x 5", air cooled, 10 HP.

AIR & ELECTRIC HOISTS
85—I & R Air Motor type, sizes LC3, A, B, C, D, D-6 & E, 300, ½, 1, 2, 3 & 5 ton.
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
1—SHAW BOX 2 ton load lifter.

BUCKET ELEVATORS
12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 16 x 8 buckets

CUT-OFF MACHINES
2—AMERICAN H-Rod Straighteners.
1—TABOR C10AF, 16" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS
3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4 & 4E. 10 to 100 lb Cores.
1—FEDERAL 40F-1 San-B o.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SPO Model SC-10-DM, hollow core.

CORE OVENS
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 6' x 6' x 9' double door, rack type, gas fired.

CUPOLAS, BLOWERS & EQUIP.
1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE
9—AMERICAN AIR FILTER Type N&W, Sizes No. 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES
1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.
1—DETROIT AA, 750# Cold Charge, 1500# molten w/400 KW transformer.
1—AJAX 50KW M.G. Set w/Furnaces—3000 cycle.
2—AJAX 20KW Hi Frequency Converters.
1—TOCCO 75KW M.G. Set—9600 cycles.

GAS & OIL FIRED FURNACES
23—LINDBERG FISHER Model MNP electric Tilt. Sizes 150, 400, 600, 1000, 1700, 2000, & 2400#, alum. cap. Gas or Oil.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200, & 550 cap. Gas or Oil.
1—LINDBERG #400 BBI hand tilt.
1—LINDBERG #300, ATH, hand tilt.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.
1—STROMAN DC "Dipout" 800# cap.
1—ECLIPSE E1000—Double Chamber Dry Hearth 1000# cap.
1—REDA #550 Hand Tilt.

HEAT TREAT FURNACES
2—L & N No. G578UB48-10, Nitrading-Electric.
2—LINDBERG 2236EH pit type, 22" D x 36" H, elec.
1—LINDBERG 3360G17 pit type, 33" D x 60" H, gas
1—L & N "Homo" 14" D x 16" H, elec.
1—SURFACE Model LO 54 x 96 Box to 1850°
1—LINDBERG 6084EH Pit Type 60" D x 84" H, 1250° Electric, 120KW.
1—INDUSTRIAL 3' x 21' Continuous "Circ Air"—1000° F.

GRINDERS
Swing Frame
1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 8, 24" x 10". 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging
2—U. S. #84, 20" x 3", 7½ HP, 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.
3—U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed

Core
2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 16" dia. Wheel.

Horizontal Disc
GARDNER No. 124—52" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES
17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Mixing Ladles, 2 & 3 ton, Electric & Manual Tilting.

MOLDING MACHINES
Jolt Squeezers
37—OSBORN, SPO, MILWAUKEE. Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt
1—J&J 50 x 72 Table—5000# cap.
2—OSBORN 60" x 72" table, 6000# cap.
1—TABOR 36" x 36" table, 1000# cap.

Jolt Rollover Pattern Draw
1—DAVENPORT 2½A, 28" x 44" table.
1—DAVENPORT 28-SA, 29" x 40" table.
1—DAVENPORT #248A, 24" x 40" table.
1—DAVENPORT #408A, 40" x 60" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL TYPE G, Sizes 20" x 8", 24" x 10", and 30" x 8".
2—J&J #612, 24" x 30" Table.
4—J&J #918, 44" x 54" Table.
1—J&J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 505, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
1—SPO 5050, Table 25" x 30", 10" draw
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift
1—DAVENPORT 34AJS, 34" x 48" Table
3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" Table.
2—J & J No. 68B, 25 x 30 Table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
2—SPO #3070, Table 26" x 35"
1—TABOR, 22" x 32" table

Pin Lift
9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs, up to 30" x 40" flasks.

Jolt Squeeze Pin Lift
1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE No. 165, 24" x 30" table.
3—MILWAUKEE #196, 17" x 38" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORNS 714PJ, 20" x 31" Tables.
1—OSBORN 716PV, Table 22" x 34", 16" cyl.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL FK-20, Size 20" x 8".
2—SPO 2192-R, 24" x 40" table, 19" cyl.
2—SPO #2114P, Table 21" x 27", 11" cyl.
2—SPO 2160-R, Table 24" x 30", 16" cyl.

CONVEYORS
Steel Apron
9—JEFFREY & LINK-BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating
1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR, No. 5 Vibrating Feeders 24" wide x 7'
LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 24' L x 4" deep pan
2—18" W x 18' L x 4" deep pan

Roller
2500' MATHEWS 6", 12", 18" wide. 2 7/16" dia. roller, ½" hex shaft, 4" channel.
1500—MATHEWS 8" x 12" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold
1—DUO-ROLL 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt
LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

HOPPERS & STORAGE BINS
7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
1—NEWAYGO HS-7-GT, Super Handy Sandy.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS
1—B & P #30 Speed Muller, 3 cu. ft. w/skip.
1—B & P #40, Speed Muller, 6 cu ft.
1—B & P #60, Speed Muller, 12 cu ft.
2—B & P #70, Speed Mullers, 18 cu ft.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu ft batch.
1—CLEARFIELD #404, 4 cu. ft. batch
1—DRAVO-DOYLE 6 cu ft cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON No. 1H Style UD—500#.
1—SIMPSON #0, style C, 175 lb.
2—SIMPSON #2, Style UD, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.
1—LANCASTER #EA-4, 6 cu. ft. w/loader.
2—B&P No. 3½ Mulbaro's.
1—FEDERAL 4 cu ft "Whirl-Mix" Muller.

SAND PREPARATORS
2—NATIONAL #3 Style C Aerators.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP, NRS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
2—MOULDERS' FRIEND 50" & 60" Brush.

SANDSLINGERS
1—B & P Motive Jr., 300 cu ft tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
6—B & P Tanks for speed slingers.
1—B & P Motive Speedslinger, 16'6" arm, 9'6" ram, 27/40 HP, w/R & L arms, 320 cu. ft. tank

SHAKEOUTS & SCREENS
1—ALLIS-CHALMERS 5' x 8', portable.
2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B
1—SIMPLICITY 4' x 8' Model D
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
2—ROBBINS 3' x 5' JF6—2000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT
2—AMERICAN 36" continuous Tumblasts
1—AMERICAN 20" x 27" w/dust collector.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN 6LG-14 Multi-Table w/dust collector.

LIFTING MAGNETS
1—MILWAUKEE 45" dia. 230 volts
1—OHIO 25" dia., 230 volts

TUMBLING BARRELS
13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 42" x 72", 48" x 72", 48" x 96".

AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

Now Liquidating

OLIVER CORPORATION'S Gray Iron and Malleable Foundries at 533 S. Chapin St., South Bend, Indiana. LATE TYPE Foundry Equipment.

FOUNDRY

6—MULLERS. 5—B&P #80
P & K Mix Muller, 24"
6—MOLDERS HOPPER LINES—100 Hoppers
7—"NO LEAK" Steel Slat Conveyors
1—MOLD CONVEYOR
20—Belt Conveyors, Trough and Flat Belt, some have magnetic pulleys.
6—Revivifiers and Sand Screens, Royer NB-2-NRS; B&P Screenerator L&S
4—Overhead Sand Bins 1000 to 4000 cu. ft.
10—Shakeouts: Robbins, Simplicity, Link-Belt
5—Oscillating Pan Conveyors
6—Bucket Elevators 41 to 60 feet
B & P Slinger Turntable
100 — MOLDING MACHINES. JOLT SQUEEZE PIN LIFTS: SPO 2222, 2160, 2148, 2136, 214, 113J, and 110J; OSBORN 276J. ROLLOVERS: SPO 507. JOLT SQUEEZE ROLLOVER DRAW 413D, PIN PUSHOFFS B & P AL 2428. SPO 2192R, Osborn Rotolift 3161.
7000' Roller Conveyor 14" to 26"

CLEANING ROOM

American Shot Blast, 2—48" x 48"; 2—42" x 36"; 4 Whiting geared motor drive tumbling barrels; 6 — HISEY WOLF Grinders 20" and 18" wheel sizes; Wood Stat. casting sorting conveyors
1—Whiting Hydroclone Dust Suppressors
3—Rotoclones—2 bag type Dust Collectors

CORE ROOMS

Core Blowers: 3—Demmler 2K, 2—Demmler #2; 4—Demmler #1; 1—Demmler #50; 2—International SB13; 9—Redford Bench type Rollover; 1—SPO 507; 6—Hand Rollovers. Coleman Car type and Young Brothers continuous core ovens, core racks, core buggies

HEAT TREATING

2—General Electric 5 ton Electric Annealing ovens 1750° and 1350°

MELTING DEPARTMENT

Cupola—3—Whiting #7; 1—Whiting #6
1—Whiting Air Furnace; 2—30A Coal Pulverizers

WHITING HYDROARC ELECTRIC DUPLEXING FURNACE 4130# cold charge, 4160 volt, 1100 KVA

Whiting Tiger Charge Crane—3—Whiting U holding ladles. Overhead scrap storage charge and weigh hoppers. Canton Shear
2—Whiting, Allis Chalmers Cupola blowers. Whiting Slag Disposal Units. 36 Modern Pouring devices. Scales 100# to 12,500#

CRANES

2—Whiting 7½ ton 105' Span OET Cranes
12—CLEVELAND Bridge Cranes, 880' 10" arch beam, 2000 feet "T" rail
15—CLEVELAND Hot Metal Carriers, 2600'—10" and 12" arch beam rail
11—Electric Monorail Hoists 1—5000#
STRAIGHTENING PRESS: 25 TON OIL GEAR
AIR COMPRESSOR—300 H.P. Synchronous Chicago Pneumatic

WRITE • WIRE • PHONE

ACME EQUIPMENT CO., INC.

LIQUIDATION OFFICE: Phone Atlantic 9-9263 533 S. Chapin St. P. O. Box 486 • South Bend, Indiana
Chicago Office & Warehouses • 126 S. Clinton St., Chicago 6, Illinois • ANdover 3-3430

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CLASSIFIED ADVERTISING RATES

(Effective July 1, 1956)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted" — "For Sale" — "Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

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Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
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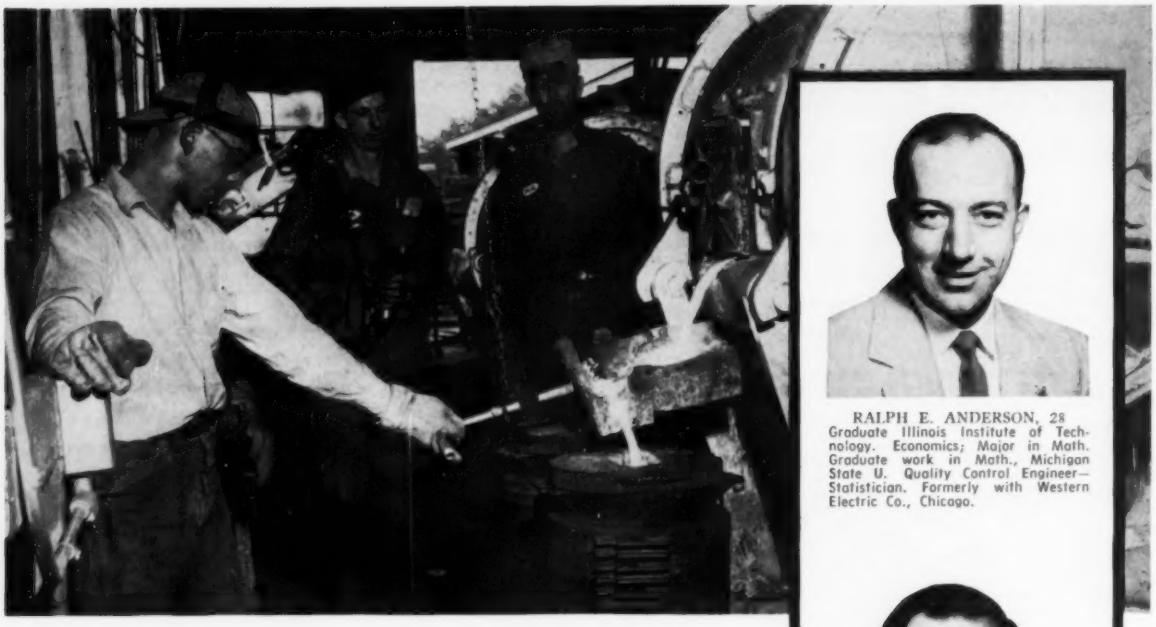
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page)	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO



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EGGHEADS

IN THE FOUNDRY?

Not many years ago, "eggheads" like mathematicians and statistical analysis engineers were strangers in foundries. Today, however, the basic foundry industry has evolved from an artisan's craft to a highly scientific, technological field. It requires engineering talent in many areas such as electrical, mechanical, metallurgical, and statistical engineering.

Engineering Castings Inc., Marshall, Mich., provides an excellent example of the technical and scientific nature of the modern foundry industry and the high degree of knowledge required of its technical personnel. ECI sometimes is referred to as the "prescription-counter" foundry because of the number and complexity of the alloys it runs to produce a wide range of quality castings for engineering applications in many industries.

At Engineering Castings, castings are produced, under strict process and quality control methods, to exacting metallurgical specifications, physical standards, and dimensional tolerances. Some castings even are produced to a metallographic go, no-go requirement. Controlled microstructure must be held within two limits metallographically. Nature, size, and distribution of the graphite and carbides and the matrix itself are held to tight specifications.

Two of the younger engineers on whom Engineering Castings relies for the high degree of specialized knowledge necessary to meet these quality standards are pictured here.

The Foundry Educational Foundation—created by and for the foundry industry—provides the principal source of critically needed engineering and scientific personnel. Availability of an adequate supply of technical manpower depends on your support. You can become a partner in engineering progress in cast metals by participating in the Foundry Educational Foundation.

Attend the 12th Annual College-Industry Conference, Hotel Statler-Hilton, Cleveland, Ohio, March 18-19, 1959

Foundry Educational Foundation

1138 TERMINAL TOWER BUILDING • CLEVELAND 13, OHIO

The Foundry Educational Foundation does not pay for this advertising. This advertisement has been prepared and the space contributed by FOUNDRY magazine in support of FEF's constructive program for foundry industry progress through education.

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FOUNDRY

Penton Building, Cleveland 13, Ohio
Main 1-8260

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Murray Hill 2-2581

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A. W. JOHANSEN, L. R. HETKE
Whitehall 4-1234

Cleveland 13 .....1213 West Third St.
A. L. KLINGEMAN, E. H. THOMAS
K. L. MOUNTAIN
Main 1-8260

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F. J. ALLEN
Griffin 7854

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F. J. FULLER
Webster 1-6865

San Francisco 4 .....57 Post St.
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Sutter 1-5568

Detroit 35 .....15800 West McNichols Rd.
Broadway 3-8150

Pittsburgh 19 .....2837 Koppers Building
Atlantic 1-3211

Washington 4 .....1123 National Press Building
Executive 3-6849

Clearwater, Fla. .....1954 Jeffords Drive
H. G. ROWLAND
(Clearwater) 39-9493

Dallas 35 .....818 Exchange Bank Building
JAMES H. CASH
Fleetwood 1-4523

London .....2 Caxton St., Westminster, S.W. 1
JACK C. G. CRUMP

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NEW EQUIPMENT DIGEST • AUTOMATION

FOUNDRY is edited primarily for management, production, technical and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve key foundry personnel on an individual or routed basis. A limited number of copies is supplied at no cost to educational institutions.
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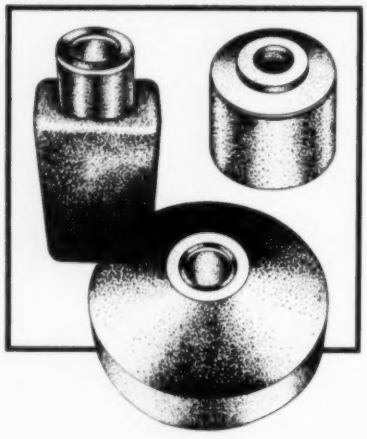

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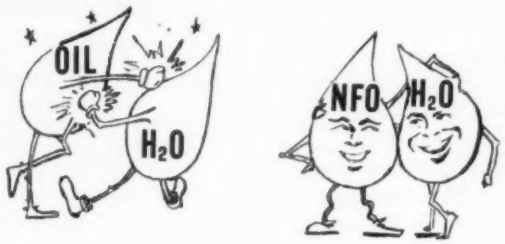

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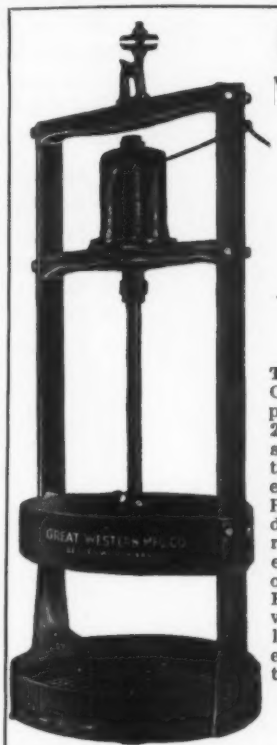

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TYPE "CS". Complete price $395.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs., ⅓ H.P. enclosed motor.

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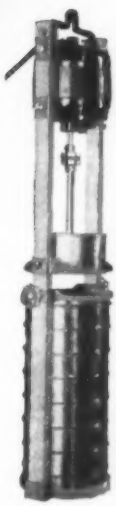
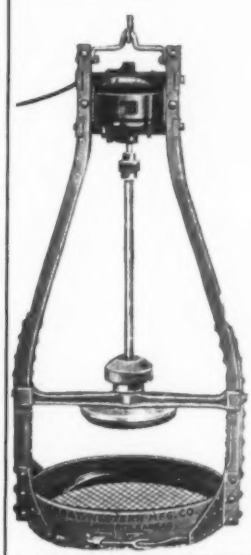


TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.



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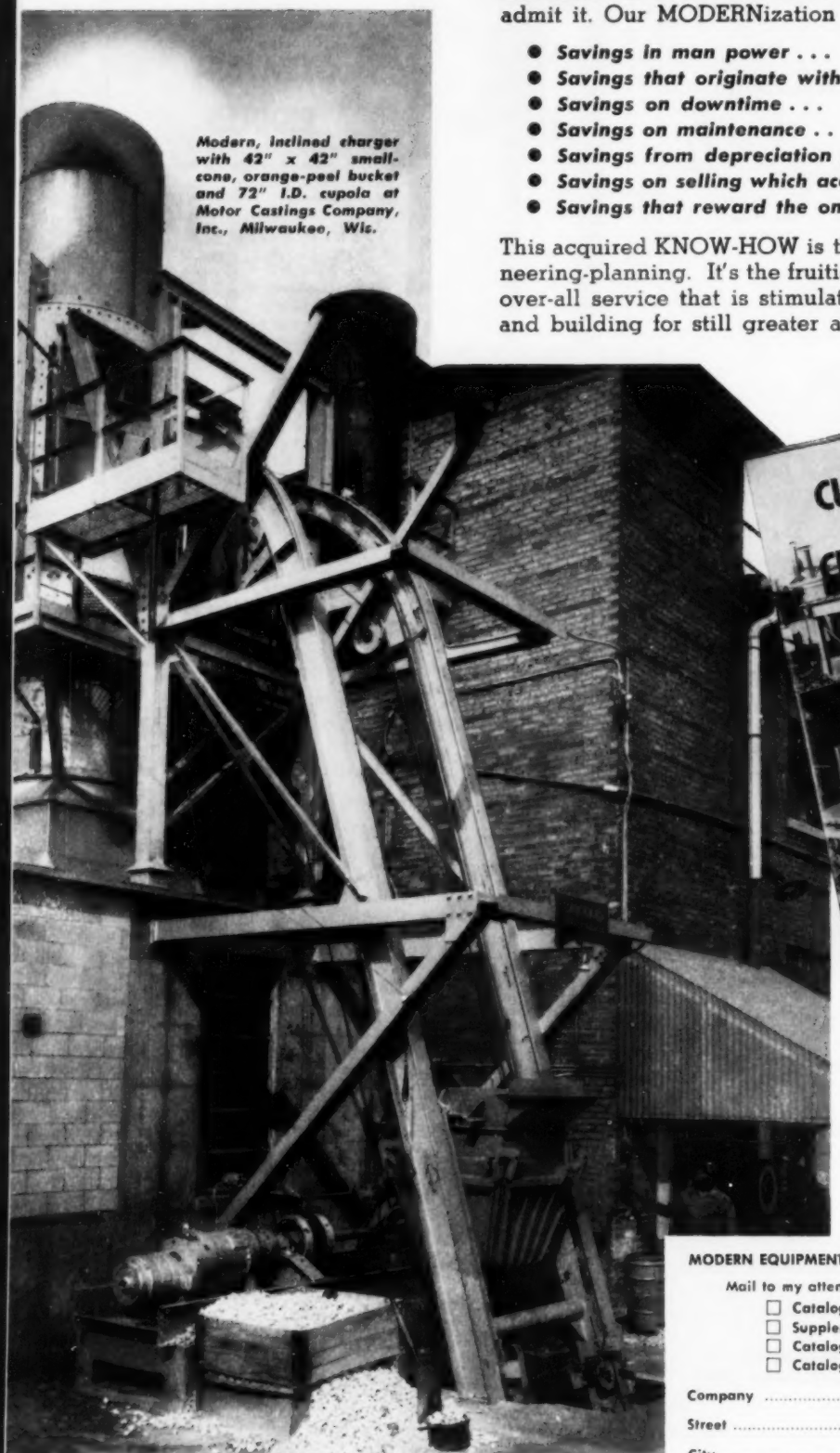
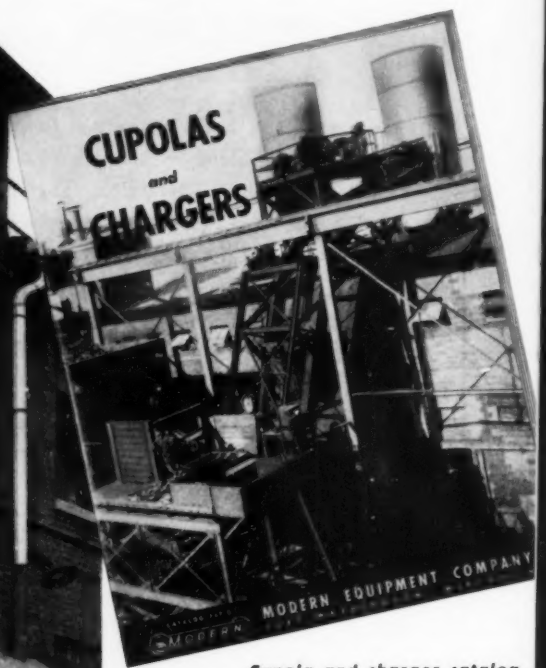
- ***Savings in man power . . .***
- ***Savings that originate with the holding of top technicians . . .***
- ***Savings on downtime . . .***
- ***Savings on maintenance . . .***
- ***Savings from depreciation policies . . .***
- ***Savings on selling which accrue from better castings . . .***
- ***Savings that reward the one-best application of equipment . . .***

This acquired KNOW-HOW is the priceless ingredient in our engineering-planning. It's the fruition of 35 year's experience. It's an over-all service that is stimulating the confidence of new friends and building for still greater achievements for tomorrow.



Modern, inclined charger with 42" x 42" small-cone, orange-peel bucket and 72" I.D. cupola at Motor Castings Company, Inc., Milwaukee, Wis.



Cupola and charger catalog, with water-cooled supplement, will be mailed on your request.

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MODERN

REPRESENTATIVES IN ALL PRINCIPAL CITIES OF THE WORLD

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- ☐ Supplement 149-A on water-cooled cupolas . . .
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Company .....

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My Name .....

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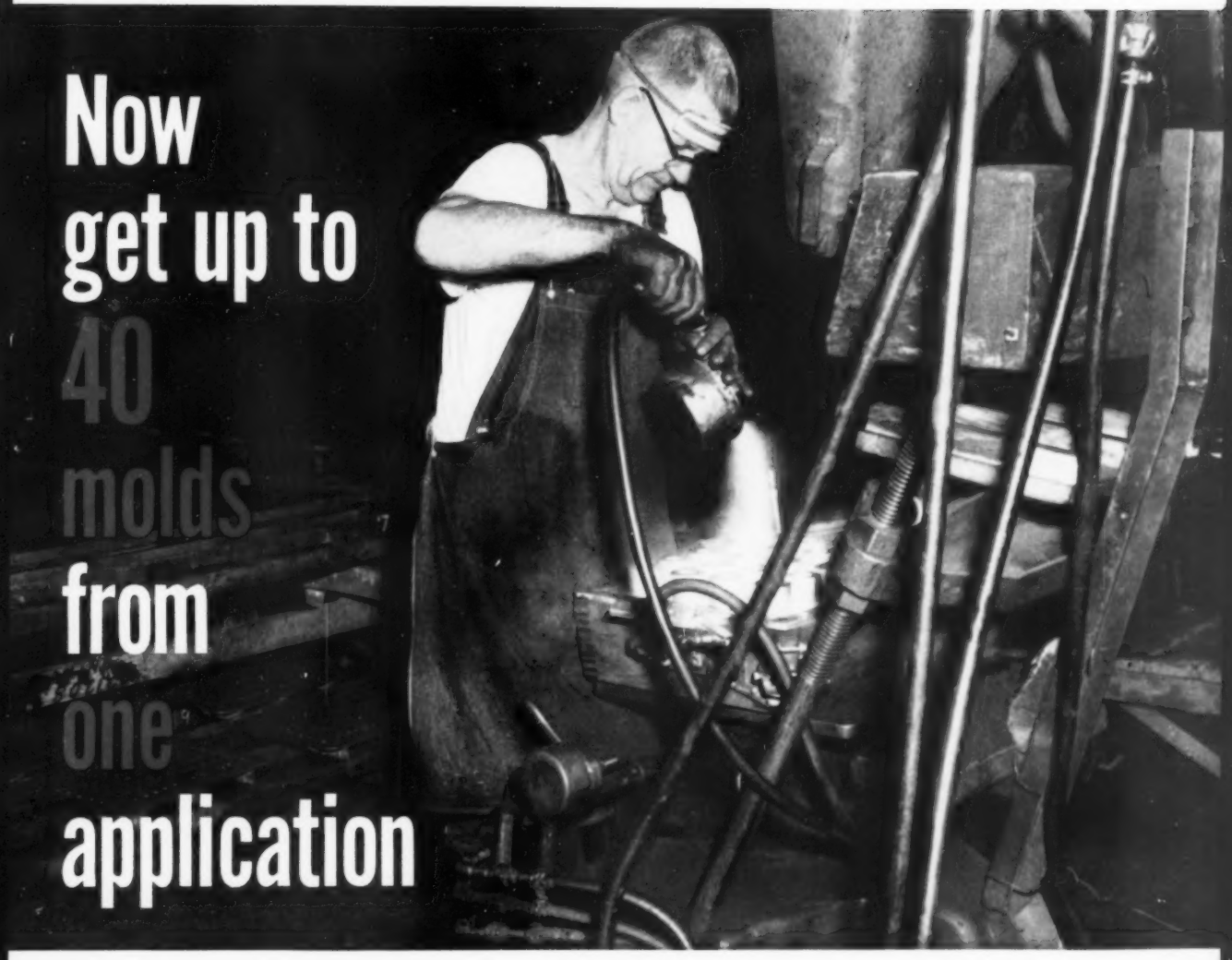

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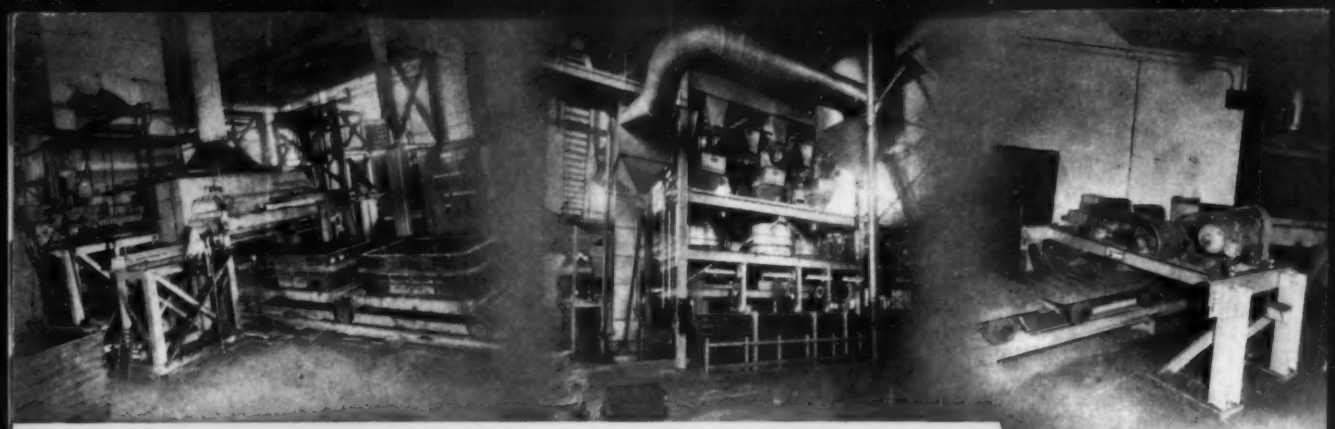
EVERYTHING FOR A FOUNDRY



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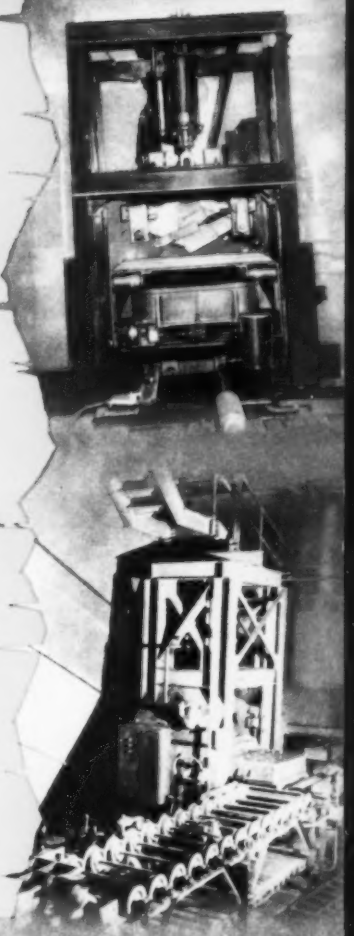
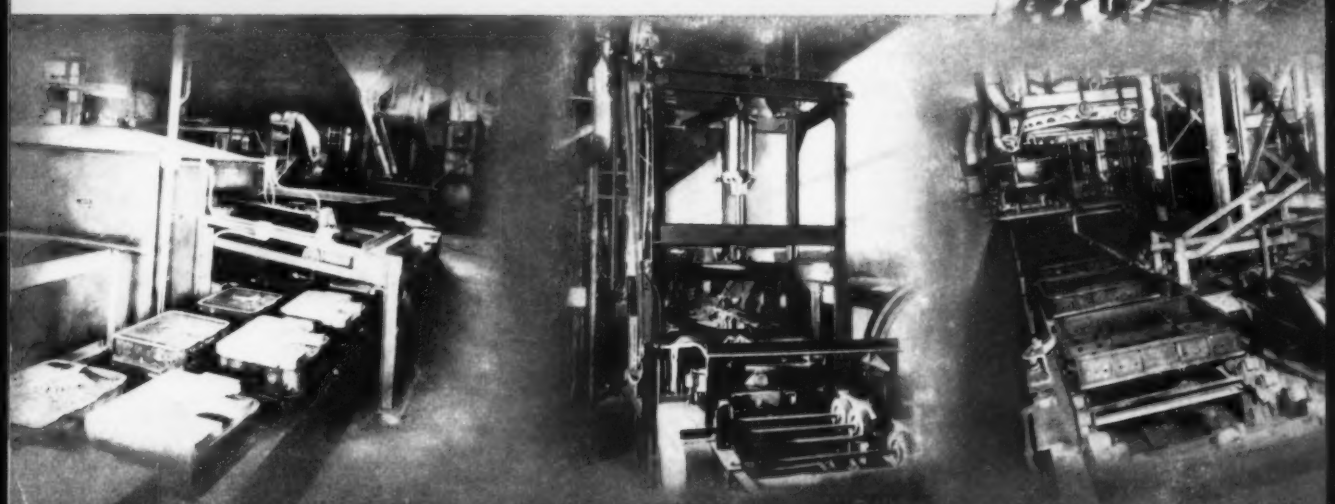


Let us work with you on your next project!

THE C. O. BARTLETT & SNOW COMPANY

Designers, Engineers, Fabricators and Erectors of Foundry Equipment

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